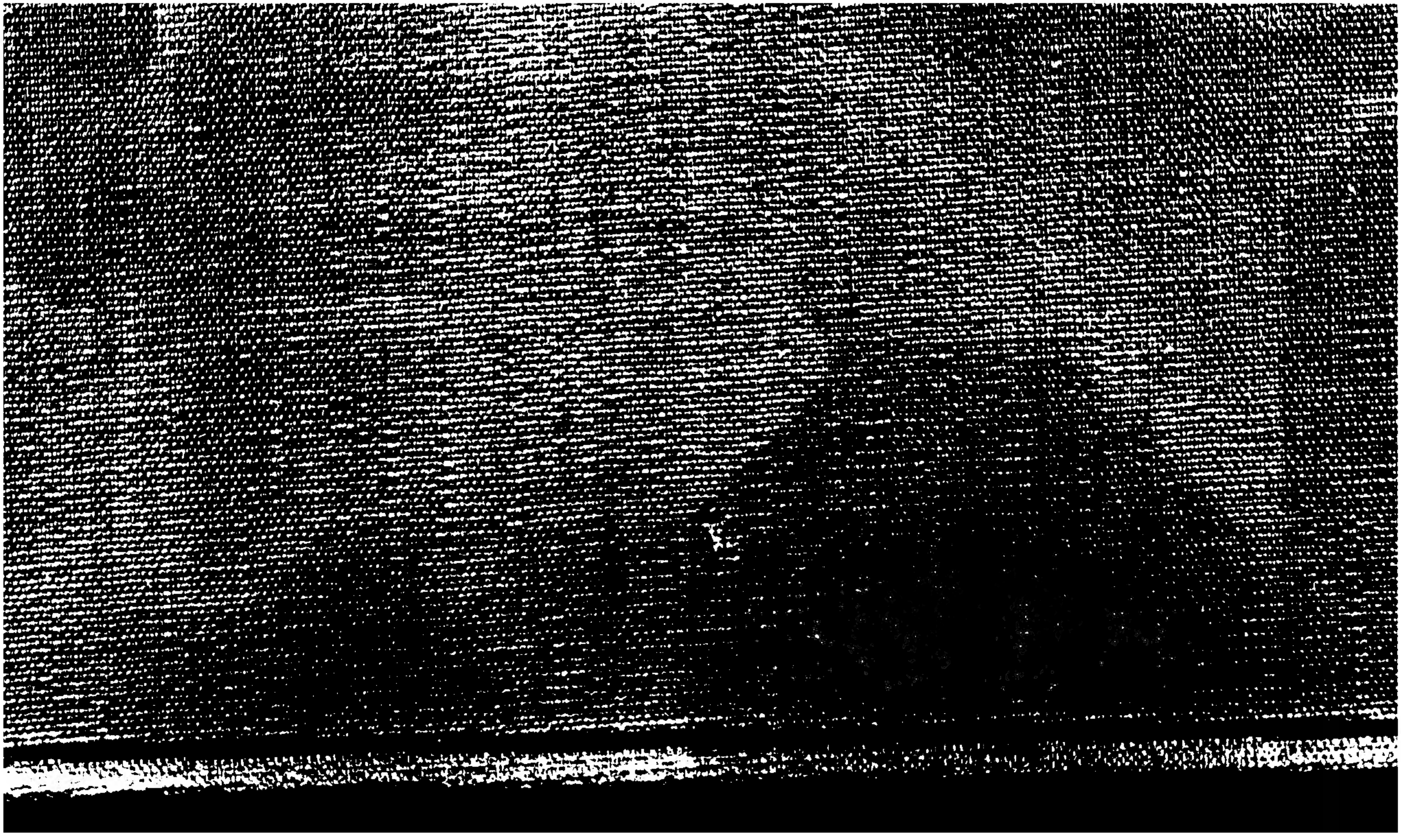

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EDITOR

FRED J. SEAVER

Curator

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SHORE OF LAKE WASHINGTON, SEATTLE.

JOURNAL

OF

The New York Botanical Garden

VOL. XIII January, 1912. No. 145.

COLLECTING FUNGI ON THE PACIFIC COAST.

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: Following your instructions to explore the Pacific Coast at several points in search of the larger fungi, I left New York October 13, accompanied by Mrs. Murrill, and went first to Seattle, Washington, where we made our headquarters for two weeks, and later proceeded down the coast with the approach of wintry weather.

The only stop made on the way to Seattle was at Chicago, where I visited the Field Museum of Natural History and delivered a public lecture on edible and poisonous fungi.

From the car windows, a general idea of the botanical features of the country was obtained, with the gradual change to new floral elements as new regions were entered. In Minnesota and North Dakota, immense fields of black prairie soil were becoming tinged with green by the sprouting wheat, and the last of the threshing was in progress. Trees were scarce, occurring in widely scattered groves consisting chiefly of oaks, birches, and poplars. Crossing the Canadian boundary into Saskatchewan, similar conditions of soil prevailed, but most of the wheat was still in the shock, and trees were rarely seen. Beyond Moose Jaw, much of the country is barren and hilly with scattered clumps of shrubs, resembling moorland, and is suitable only for grazing. All the lumber used throughout this region for building and railway purposes is brought from the Canadian Rockies. Posts and telephone poles are made of western white cedar.

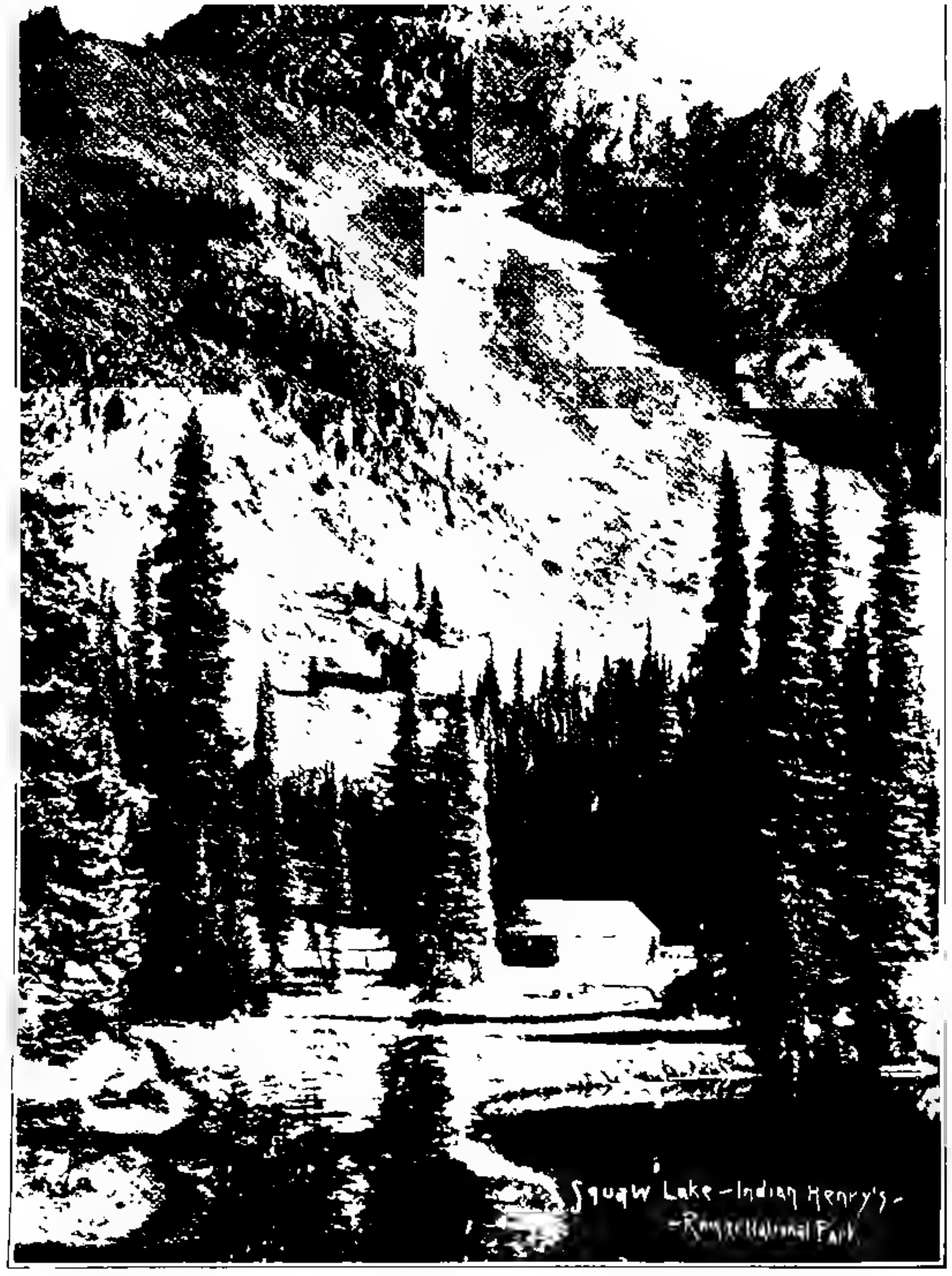
On the morning of the fourth day from New York, the moun-

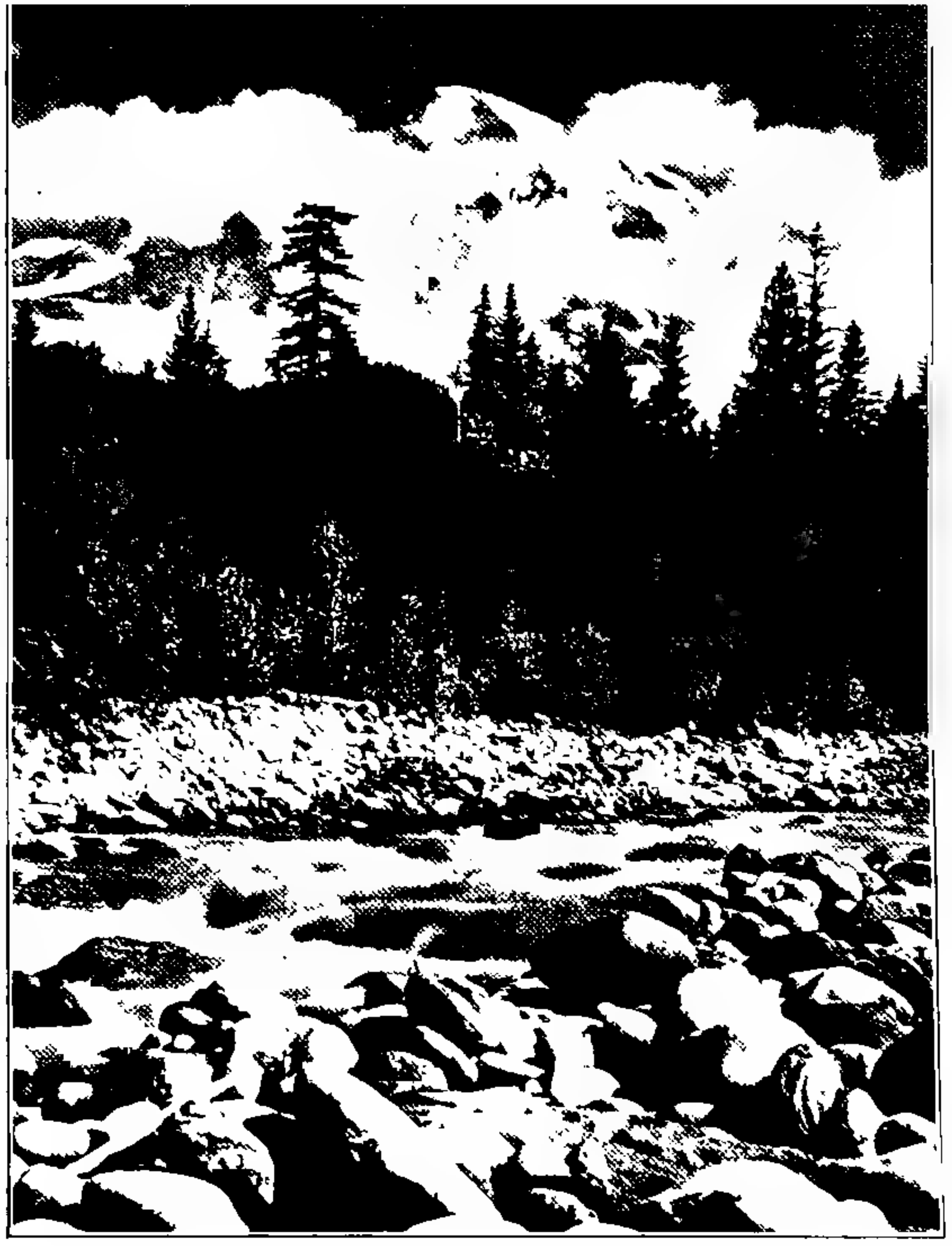
tains were reached, and twenty-four hours were required to cross the two systems between Calgary and the coast. The scenery of this region is remarkably fine and strongly contrasted with the boundless stretches of prairie previously traversed. A complete change also takes place in the flora: splendid coniferous forests clothe the flanks of the snow-capped mountains, while aspens, alders, and willows mingle with firs and pines in the valleys. Extensive ranches with great herds of cattle, horses, and sheep; mines of various kinds; and large lumber camps and sawmills are passed in quick succession. At Banff, the Canadian Government has made one of the largest park reservations in the world, containing nearly 6,000 square miles of territory. Laggan, at 5,000 ft. elevation, is a small station with a few log bungalows, dense forests of firs and pines, and superb scenery. This place and Glacier, in the Selkirks, appear to be choice localities for collecting fungi in the summer. The summit of the Rockies is reached at Stephen, 300 ft. higher than Laggan, where the "great divide" occurs. A descent of 1,000 ft. is quickly made to Field, where watches are set to Pacific time, and nearly another thousand feet brings one to Palliser, named for one of the first expeditions to explore the Rockies, in 1858.

Golden is at the foot of the Rockies, and across the Columbia River to the west rise the heavily forested Selkirks still to be crossed. Among the somber-hued conifers, scattered poplars stand out vividly in their yellow autumn coloring, and birches reappear below 3,000 feet. Several new trees, some of them belonging to the Pacific Coast, make their appearance here.

Early on the morning of the fifth day, the valley of the Fraser River was reached, at slight elevation above sea-level, and we entered the rich grazing and lumbering region that continues all the way to Seattle, where we arrived in the middle of the afternoon.

Seattle, with a population of 300,000, is one of the most progressive and promising cities of the West. The climate is mild and humid, adapted to a luxuriant vegetation; the soil is glacial drift, through which streams easily wear deep gorges in which great trees grow and shelter myriads of smaller plants. Some





VIEWS IN RAINIER NATIONAL PARK.

of the finest of these gorges are included in the system of public parks; the botanist need not leave the city limits to find splendid collecting ground. Although bear, deer, grouse, wild geese, pheasants, gophers, etc., abound, there are no noxious reptiles or insects to disturb the collector. Beyond the city lie immense primeval forests of great beauty, containing giant red firs and white cedars over a thousand years old and from six to fourteen feet in diameter, pine and spruce in abundance, some hemlock, and scattered trees or clumps of oak, maple, alder, willow, and cascara. All of these trees are different from our eastern species.

The red fir, *Pseudotsuga taxifolia*, is the principal timber tree; the white cedar, *Thuya plicata*, is extensively used for shingles and posts, the heartwood containing an oil which resists decay; the large-leaved maple, *Acer macrophyllum*, is planted on the streets for shade throughout much of the Pacific Coast region, and the trunks often develop cancerous swellings which supply a fine "curly maple" for furniture; the single species of oak is usually so knotty and misshapen that its chief use is for firewood; "Cascara Sagrada," *Rhamnus Purshiana*, furnishes the well-known medicinal bark of commerce.

The University of Washington, situated in the suburbs of Seattle on the shore of Lake Washington, is unexcelled for location, the campus being one of the finest in the world. Several of the permanent buildings and many of the exhibits used in the exposition of 1909 were afterwards turned over to the university, the forestry and ethnology exhibits being particularly good.

We established ourselves at the University Inn, within a short distance of the botanical laboratories, and made excursions into Woodland Park, Ravenna Park, the forest north of Ballard, the shores of Green Lake and Lake Washington, a peat bog, and other localities that offered good opportunities for collecting fungi. These excursions were planned by Professor T. C. Frye, head of the botanical department, who very kindly placed at our disposal all necessary facilities. He also arranged to have Mr. S. M. Zeller, a graduate student in his department and an excellent collector, accompany me on many of these excursions.

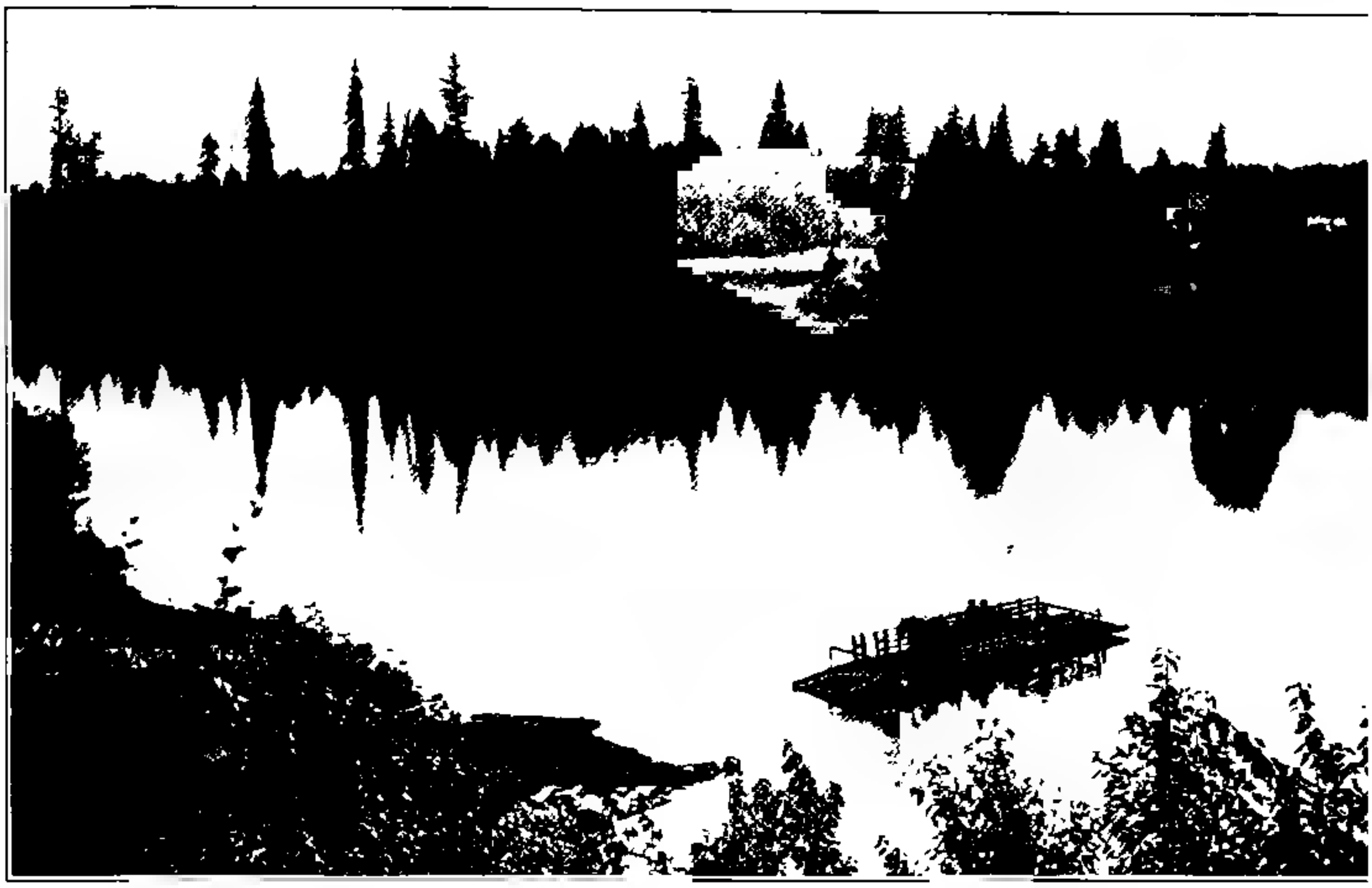
The number of fungi secured was far greater than I had anticipated. The season was exceptionally good and the weather unusually favorable both for collecting and preparing the specimens. Four boxes, containing 732 field numbers, or about 2,000 specimens, accompanied by descriptive notes, were sent to New York at the end of two weeks' stay in Seattle. It is estimated that over 100 species new to science are represented in this collection.

On October 26, a visit was made to Tacoma Prairies, about fifty miles south of Seattle. During the forenoon, the shores of a lake to the north of the prairie proper were explored and similar conditions to those at Seattle were encountered, although a number of species new to our collection were obtained. Here in the forest of *Abies grandis*, fine specimens of *Fomes Laricis*, a medicinal polypore rare in America, were found on fallen trunks; also a remarkable "fairy ring" one hundred feet in circumference formed by seventy-seven sporophores of a species of *Tricholoma*, some of them six inches in diameter.

The prairies are formed by a terminal moraine of considerable extent, the soil of which is so sterile that very little cover is found upon it. A short, slender grass, a resurrection moss, a pretty violet, one or two hawkweeds, and clumps of young *Abies grandis* just arriving after so long a time from the adjacent forest, with scattered specimens of *Pinus contorta*, constitute the chief vegetation in the autumn season. A single species of gill-fungus and a few puffballs grew in the open on these prairies, but a number of species, many of them similar to those of the pine barrens and peat bogs about Seattle, were found in the shade of the clumps of young fir trees.

The pleasure of the Tacoma trip was much enhanced by the splendid views obtained of Mt. Rainier, whose giant, snow-capped cone rises to the height of 14,500 feet above the coastal plains.

On Friday, November 3, we left Seattle for Salem, Oregon, arriving at 10 P.M. It had been our intention to do some collecting in the vicinity of Salem with Professor Morton E. Peck, of Willamette University, but we found by conference with him



THE WILLAMETTE RIVER, OREGON

LIFE SAVING STATION, WITH SCRUB PINES, NEWPORT, OREGC

that instead of three or four inches of rain, the usual quantity for October, there had been only one-half an inch; so we proceeded next day to Corvallis and established ourselves near the new Agricultural Hall of the Oregon State College, within easy reach by three separate railway lines of the western slopes of the Cascades, the Coast Range, the intervening valleys, and the immediate coast. Some of the most promising localities were selected for us by Professor H. S. Jackson and these were visited in order. The weather, which had been rather dry for fungi, became stormy upon our arrival, and every day was more or less rainy. Periods of low temperature after the rains appeared interfered considerably with the development of gill-fungi, but by visiting sheltered places a very good representation of species was obtained.

On Monday, November 6, several hours were spent in exploring a dense fir forest south of Corvallis, which contained scattered specimens of oak, willow, and maple. A majority of the fungi found were similar to those at Seattle, but a considerable number were different; also, several eastern species were collected here that had not been seen in Washington. *Paxillus involutus* reached a foot or more in diameter; *Hygrophorus eburneus*, *Boletus luteus*, and *Lactaria deliciosa* were very abundant; *Hydnum Auriscalpium* occurred commonly on the fir cones; *Amanitopsis vaginata*, *Craterellus cornucopioides*, *Marasmius siccus*, *Russula nigricans*, *Tyromyces chioneus*, and *Armillaria albolanaripes* were found once or twice.

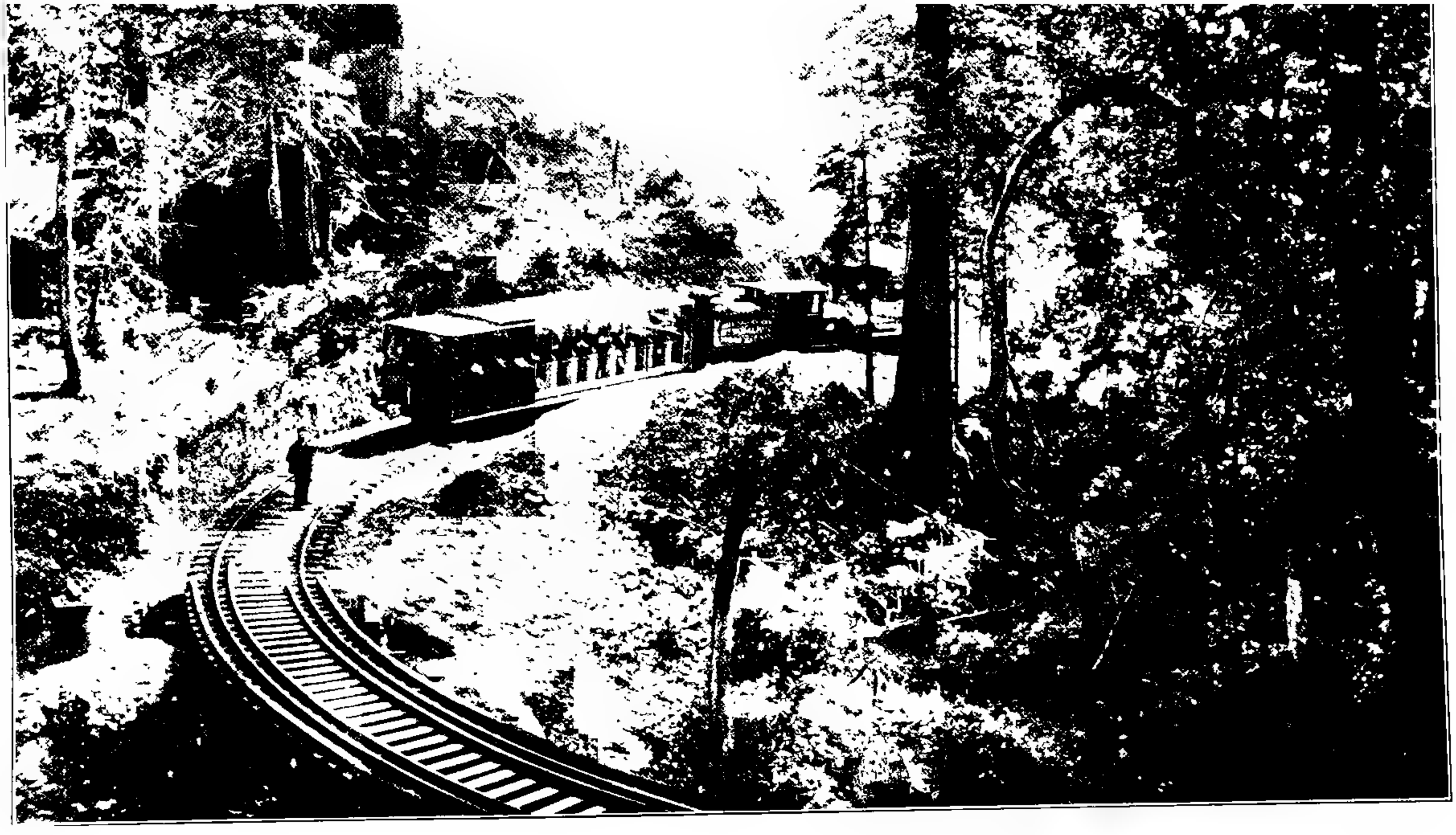
The following day, November 7, was spent at Glen Brook, twenty-three miles south of Corvallis, one of the terminals of the Corvallis and Alsea River Railway. The speed of the lumber train was six miles an hour, affording ample opportunity to make observations along the way. This entire valley of the Willamette River was formerly a lake and even yet is flooded during a portion of the winter, when wild geese frequent it in large numbers. The abundance of wheat stubble and clover also proves very agreeable to the handsome Chinese pheasant which has multiplied greatly in this valley since its introduction in 1877. The hills were covered with gnarled and

twisted oaks, *Quercus Garryana*, which supported great quantities of mistletoe and a long gray lichen similar to the Spanish moss of tropical America. This lichen, a species of *Alectoria*, is very abundant on trees of all kinds on the Pacific Coast.

In the old fir forests at Glen Brook, from 400 to 1,000 feet elevation, there was splendid collecting, and I traveled a linear distance of about ten miles on foot before the train was ready to return. Mr. Carter, the owner of much of this woodland and the promoter of the railway, showed me every courtesy, and while the sparks from the fir in the fire-box of the engine lighted the sky like myriads of fireflies, he gave me an account of handling red fir and white cedar logs twelve feet thick with donkey engines. Indeed, some of the logs on our train were so large that it was deemed dangerous to pass the bridge near Corvallis in the dark, so we left the train there and walked into town.

All of the next day was required in working up the Glen Brook collection and getting the specimens to drying. On account of the rains, artificial heat had to be used for all the Oregon collections. A room with a large sheet-iron stove was devoted to this purpose, and over the stove were suspended parallel frames of wire netting, on which the specimens were spread. When completely dried, they were wrapped in newspaper with the accompanying field notes and descriptions and laid away in drawers until the time for packing and shipping arrived, when they were sent by express to New York to be put into boxes with naphthalene flake and kept in a dry place until my return. If not shipped promptly, there is danger of moulding, of insect attack, and of injury from frequent handling. Colored sketches, made by Mrs. Murrill, were numbered to correspond with the specimens and retained for comparison with later novelties.

On November 9, before daybreak, I left for a day's collecting at Mill City, on the western foothills of the Cascades fifty miles east of Corvallis, where there are large sawmills and virgin forests of red fir and other conifers. The yellow fir forests begin at Granite Mountain, a few miles farther on, but a snowstorm had visited this region and rendered collecting difficult if not impossible.



ON THE WAY TO MUIR WOODS.

On arriving at Mill City, I first climbed to 1,200 feet, north of the town, and spent the forenoon among the ancient red firs that afforded a partial shelter from the snowstorm that continued without intermission all day. The fungous flora here was not extensive, owing to the cold, but was quite different from that of the Willamette Valley. A large and handsome new species of polypore was found growing on a rich bank beneath one of these old firs

The low, dense forests along the river were visited in the afternoon and many specimens secured, the majority of them similar to those found at Glen Brook. The next day was devoted to these collections. An excursion with Professor Jackson was arranged for Saturday, but an unusually heavy snow and a cold wave interfered, followed by a cold rain lasting all day Sunday.

On Monday, November 13, I crossed the Willamette River east of Corvallis and explored the low mixed forest in the river bottoms, giving attention chiefly to the dead logs and branches left by the lumbermen. On the under side of these logs, where the cold had not penetrated, a number of interesting timber-destroying species occurred. A second visit was also made to Hyatt's woods, south of town, where a few additional species had appeared since the heavy rains began.

On the afternoon of November 13, I boarded the daily train for Newport, situated on the coast at the mouth of Yaquina Bay seventy-five miles west of Corvallis. For some distance, the railway crosses the prairie valley of the Willamette and then begins the ascent of the Coast Range, following the windings of a rapid mountain stream. All of the timber between Corvallis and the coast near the railway has been burned off in the past and there seems little chance to collect except in some of the small wooded flats along this stream. Just before reaching Summit, the conditions seem fair. Again, at Elk City, beyond the Coast Range, another stream joins the one the railway follows and this flows through good timber several miles above Elk City. At Yaquina, passengers for Newport cross the bay in a small steamer, arriving about 6 o'clock at the little seaside resort built along the bay front and protected from the ocean winds by steep

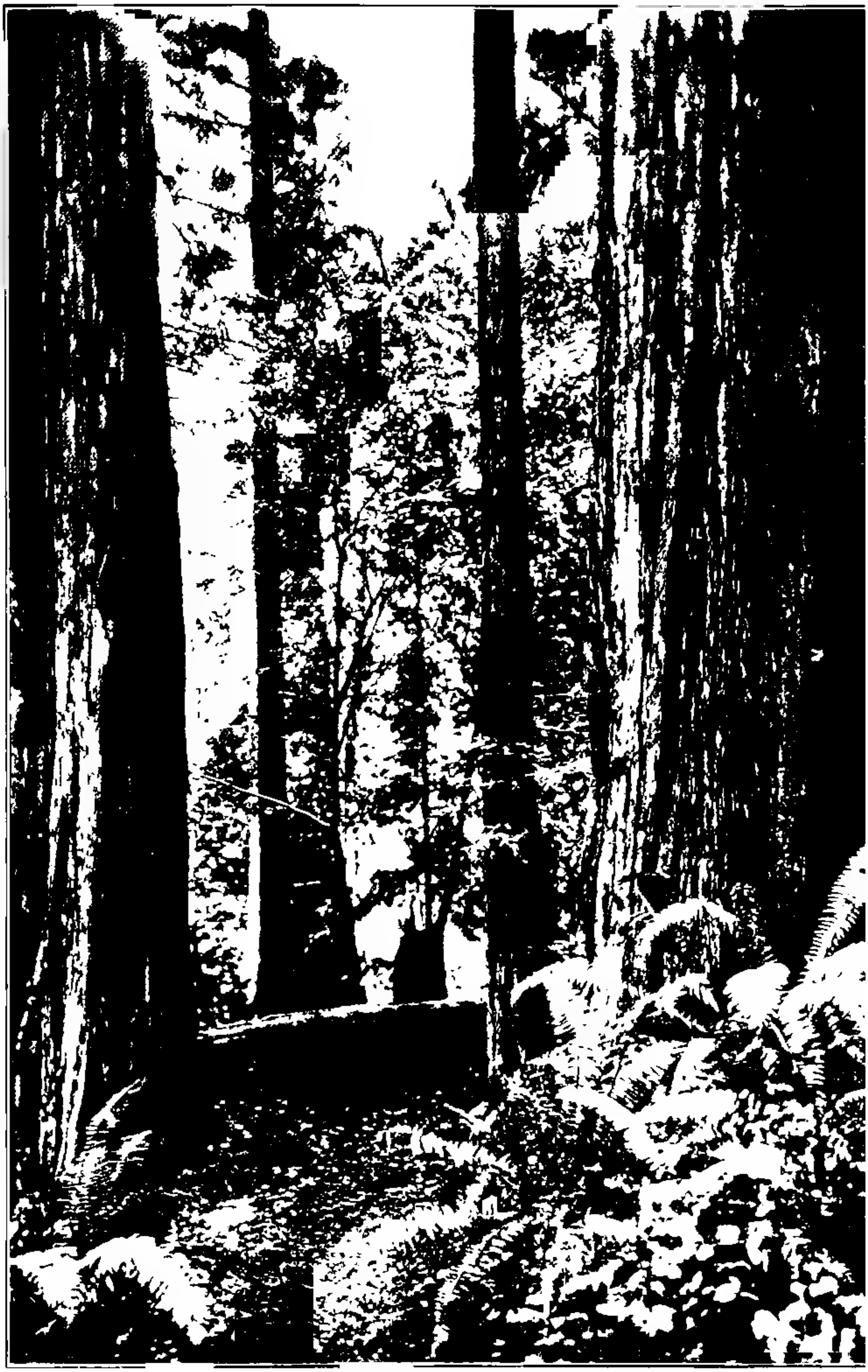
sandstone hills on the north and northwest. There is a good hotel and good beaches, which attract a number of transient visitors during the summer. Also, a good many persons own cottages along the bay and ocean front.

On the next morning, November 14, I braved the storm that had raged for two days and explored the pine barrens covering the sandy headland lying back of the life-saving station. This proved to be an exceedingly interesting region, yielding many novelties. I was much impressed with the ability of fleshy fungi to thrive in almost pure sand. Here under the pines I found numbers of specimens of the brilliant orange-red form of *Amanita muscaria*, which I was to see later in California. *Rostkovites granulatus*, one of the edible boleti, also occurred here in great abundance.

After the turn of the tide, I went eastward from Newport along the beach a few miles and turned into a lumber trail up a small stream, where the usual virgin forest conditions prevailed and the fungous flora was more like that in the Willamette Valley. The day's collections, which were large and important, were so saturated with water that they had to be spread out in a steam-heated room over night to reduce them to a normal condition and prevent many of them from collapsing completely. During the return journey to Corvallis next morning, I was able to complete the descriptions and have the specimens ready for the much-needed drying process.

Continued adverse weather conditions caused us to leave for California a few days earlier than we had planned. The Oregon collections, comprising nearly 400 field numbers, were shipped direct to New York and we caught the midnight express at Albany, November 16, bound for San Francisco.

The railway journey from Corvallis to San Francisco occupied two days, our train being held up fourteen hours at Keswick by a wreck. The Siskiyou Mountains, separating Oregon from California, were crossed after a very steep climb up to 4,000 feet from the fertile and beautiful Rogue River Valley. Soon after leaving Ashland, we entered a forest of oaks so abundantly covered with mistletoe that the trees appeared evergreen after



IN THE HEART OF MUIR WOODS.

their leaves had fallen. The southeastern slope of the Siskiyou range was clothed with a splendid forest of *Pinus ponderosa*, much resembling the forest of Montezuma pine west of Jalapa in Mexico.

As we descended into the valley and crossed the line into California, a very decided change took place in the climate and the flora, owing to the small rainfall. Stunted, thorny shrubs, and scattered trees (*Libocedrus decurrens*) partly covered old lava streams and volcanic hillocks. At Redding, cycads were growing in the open and new trees of various kinds appeared, belonging to a warmer and drier region. Several species of oaks, most of them evergreen, took the place of the single species found in Washington and Oregon. The large spherical live-oaks are left in the fields for shade, as palms are in the tropics. At Vina, the largest vineyard in the world, belonging to Stanford University, is located. The vines are kept cut back to short stumps very close to the ground, giving them a totally different appearance from those of either northern or southern Europe. Eucalyptus trees, so commonly planted in southern California, were first seen at Marysville, not far from Sacramento. Extensive orchards, hop-fields, cattle ranches, and wheat-fields dotted the valley in this region, and the entire country as far as the eye could reach seemed a fertile and promising one.

The first excursion for fungi after reaching San Francisco was made to Golden Gate Park, a large and handsome public plantation overlooking both the city and the ocean. The season, however, was unusually dry and very few specimens were found, most of these being gathered among the tree-ferns in a shaded ravine. During a period of rainy weather, the extensive wooded areas of this park should yield a rich harvest of fungi.

On Monday, November 20, we visited the University of California and made arrangements through Professor Setchell and Mrs. Brandegee to examine the Harkness' types of fungi placed in storage by the California Academy of Sciences after the loss of their building during the great earthquake. These types are in envelopes within pasteboard boxes and are in good condition. The Academy is preparing to erect a handsome

new building in Golden Gate Park in time for the Panama Exposition.

November 22 was devoted to an excursion to Muir Woods, the most famous collecting ground in the vicinity of San Francisco. From Mill Valley, charmingly located among hills and redwood groves and easily reached by ferry and electric train, the steep ascent of Mt. Tamalpais is easily negotiated in a train of special construction and the descent to Muir Woods is made by a gravity car. This whole region, including the mountain with its stunted shrubs and herbs, and the deep gorges in its flanks filled with immense redwoods (*Sequoia sempervirens*) and ferns, is of intense botanical interest.

Muir Woods is one of the few extensive tracts of virgin redwood forest now in existence. In 1908, the 295 acres comprised in this tract were given to the National Government by Mr. Kent and dedicated in honor of John Muir, the celebrated geologist. The largest trees, reaching 14 feet in diameter and 300 feet in height, stand on the floor of the cañon along the banks of a small stream. A few other trees, such as fir, alder, maple, and tan-bark oak, grow sparingly in the twilight between the towering redwood trunks. Muir Inn, situated on a promontory between two branches of the main cañon, is an excellent base for explorations in this vicinity. The best season for collecting fungi is usually during January and February; the best for flowers is probably in April.

On November 23, I went to Santa Rosa to see Mr. Burbank and his experimental grounds. After devoting several hours of his valuable time to my instruction and entertainment among the long hedgerows of spineless cacti and other interesting and important products of his genius, Mr. Burbank graciously remarked: "Most people take my time; a few give me theirs. You are of the latter class." One experimental plot of several acres surrounds the old homestead in the edge of the town; the other, which is much larger, is at Sebastapol seven miles away. Mr. Burbank is recognized as the greatest "selecter" of variations in plants, especially in young plants; there is no limit to his patience or devotion where a beneficial variety is concerned; he

THE OLD HOME OF LUTHER BURBANK AT SANTA ROSA, CALIFORNIA.

works with millions of seeds and thousands of seedlings in many plant families and from all parts of the world, and the climate of Santa Rosa is peculiarly favorable for plant growth and development. He has the power from long experience to judge plants at a very early stage, and he has also developed methods of forcing them quickly into fruit. An old apple tree stands in his grounds, which has been forced to mother as many as 600 tiny seedlings at one time in order to induce them to fruit in a year or two instead of requiring five to ten years. In this and many other ways, time and space are saved and quick results are obtained.

On the way to Santa Rosa, the town of San Rafael was passed, in the vicinity of which Moore collected practically all of the gill-fungi recorded in Harkness and Moore's list of Pacific Coast fungi.

On Friday, November 24, we left San Francisco for Palo Alto, the seat of Stanford University, and arranged for a collecting trip the next day with Professor L. S. Abrams in the Santa Cruz Mountains. Starting early, we drove to Preston's Ravine, at the foot of the mountains, where nearly a hundred numbers were found; then crossed over the range at an elevation of 2,000 feet and descended the western slope to La Honda, eighteen miles from Stanford, where we collected quite a number of interesting fungi in the moist redwood forest, and returned between seven and eight o'clock in the evening.

Palo Alto is a model town and Stanford University one of the most attractive institutions of its kind. The handsome buildings are all constructed according to a definite plan, and a considerable part of the campus of 8,000 acres is laid out in walks and drive-ways shaded with a variety of palms and bordered by groves of eucalyptus, live-oak, madronio, and various conifers and other evergreen trees. There are at present about 1,800 students at Stanford, 500 of whom are women. The institution is planned to accommodate not over 2,000, and it was decreed by the founder that not more than one fourth of these should be women, for the reason that an education under such favorable conditions and circumstances was deemed more necessary and more useful to men.

Nearly two days were required to properly describe and care for the collections made at Preston's, Ravine and La Honda. Some time also was devoted to the examination of specimens in the herbarium of the university. On the afternoon of November 28, I lectured before the professors and students of the botanical department on the subject of poisonous and edible fungi. Professor Abrams entertained us at his home the same evening. The following day, the final shipment of specimens was made and we left for Los Angeles and Pasadena, arriving at the latter place in time to enjoy Thanksgiving dinner with Mr. Daniel Wilson.

Pasadena is blessed with a superb climate, and is the winter home of one hundred and twenty-five millionaires. The houses are scattered over the low hills at the foot of Mt. Lowe and Mt. Wilson, the street borders and large yards being filled with pepper-trees, palms, climbing roses, orange-trees, and a great variety of subtropical decorative plants. McClatchie, the mycologist, lived here and made the largest existing collection of the mosses and fungi of southern California.

On the morning of December 1, I left Pasadena on the "California Limited" for New York, passing quickly from the great, fertile San Bernardino Valley up to the sterile tableland sparsely clothed with yucca and sage-brush, and on through the boundless desert to the region of the Grand Cañon and the Petrified Forest, where huge trees of past ages lie embalmed in agate, thence through thickets of dwarf red cedar and piñon for hour after hour, across the continental divide, past the pueblos of various Indian tribes, over Raton Pass at an elevation of nearly 8,000 feet, and down to the broad cultivated prairies again, with their wheat, corn, cattle, yucca, cottonwoods, jack-rabbits, and prairie-dog villages, until the Mississippi was reached at St. Louis.

The journey was broken here to visit the Missouri Botanical Garden and Washington University. The crowded collections of tender plants at the garden are to be housed next winter in a splendid new glasshouse 300 feet long and 60 feet high at the central dome, about equal in size to the famous Palm House at Kew Gardens. The library is one of the best in the country,

and both it and the extensive herbarium have been largely transferred to steel cases in a strictly fireproof building. The fungi collected on the Harriman Alaskan Expedition, some of which occur also in Washington, are to be found here.

Professor W. Trelease, the director, received me cordially and devoted most of the day to my instruction, entertaining me at his home in the evening. Professor G. T. Moore piloted me over the University, which is rapidly expanding in equipment and scope, and we lunched together at the University Club. After dinner, I attended the meeting of the St. Louis Academy of Sciences, an old and famous organization, of which the botanist Engelmann was the first president, and Eads, the architect of the great bridge over the Mississippi, one of the charter members.

Leaving St. Louis Monday night, I arrived in New York early Wednesday morning, December 6, and found that all my collections had arrived in excellent condition. For convenience of reference, a list of these, with localities and numbers, is given below.

COLLECTIONS ON THE PACIFIC COAST.

Seattle, Washington	October 20-November 1	Nos.	1- 732
Tacoma, Washington	October 26	"	" "
Tacoma Prairies, Washington	October 26	"	" "
Glen Brook, Oregon	November 7	"	733- 792
Mill City, Oregon	November 9	"	793- 879
Corvallis, Oregon	November 6–11	"	880–1025
Newport, Oregon	November 13	"	1026–1099
Golden Gate Park, California	November 21	"	1100–1124
Muir Woods, California	November 22	"	1125–1158
Preston's Ravine, California	November 25	"	1159–1241
La Honda, California	November 25	"	1242–1305

It is estimated that this collection of fungi comprises about 3,700 specimens, and is easily the largest, most comprehensive, and best ever made on the Pacific Coast. When it has been worked over and compared with other collections from the same region, our knowledge of the fungous flora of that vast and intensely interesting land lying west of the Cascade Mountains will be much increased.

Aside from the interesting botanical features of the Pacific Coast, the botanical explorer cannot fail to be impressed with the

vastness of things—ranches, orchards, vineyards, forests, lands to be tenanted, deserts to be reclaimed, mines to be worked—and with the big-hearted, patriotic, unshackled, enterprising, hopeful men and women who are pushing this section to the front. The enthusiasm everywhere shown in preparation for the coming Panama Exposition is only an illustration of the human energy that is actively asserting itself from one end of the Coast to the other.

Respectfully submitted,
W. A. MURRILL,
Assistant Director.

CONFERENCE NOTES.

The conference of the scientific staff and students was held in the main laboratory on December 4. The first paper, by Mr. William R. Maxon, of the U. S. National Museum, was entitled "Notes on the Tree Ferns of North America." The speaker enumerated the main features regarded as important in the major classification of the Cyatheaceae, and particularly of the tribe Cyatheae which is usually regarded as embracing three genera, *Cyathea*, *Alsophila* and *Hemitelia*, separated mainly upon characters of the indusium. Jenman and, more recently, Copeland have argued against maintaining these genera, the latter author reducing all to the single genus *Cyathea*, with several subgenera. The justification of this treatment was discussed at some length and the need suggested of a thorough revision of the group upon characters of minute morphology other than those of the indusium.

Mr. Maxon also reviewed a recent paper* describing a peculiar new fern from Panama, *Polypodium podocarpum*, a subpinnate species in which the sori are essentially apical upon special lobes of the pinnae and the apices of the fronds and of the pinnae are of indefinite evolution. The pinnae are produced frequently to a remarkable length, especially by injury to other parts of

* Maxon, William R. A remarkable new fern from Panama. (Smithsonian Miscellaneous Collections. Vol. 56, part 24. Pp. 1–5, *pls.* 1–3. November 22, 1911.)

the frond. Several other examples of indeterminate apical growth in *Polypodium* were given and specimens of these shown.

The topic "A Subgenus of *Vittaria*," was presented by Dr. R. C. Benedict as follows: *Vittaria* J. E. Smith is a genus of perhaps forty species of tropical ferns, nearly all of which have leaves of grass-like outline. Its classification is, therefore, more difficult than in the case of most fern genera, and is indeed much the same problem as would be offered by a genus of grasses if no flowers and fruits were available. The differentiation of the species demands a careful study of the microscopic characters of the spores, paraphyses, and scales, and a study by cross-sections, of the arrangement of the vascular tissues in stem and leaf, and of the position in which the sporangia are borne. By using these methods of study, it has been found possible to determine specific limits accurately.

The paper presented at the conference was concerned with one subgenus of *Vittaria*, *Radiovittaria* including seven species, the characters of which have been sufficiently determined for publication. Illustrations of the seven species were shown. These with the text descriptions and discussion are shortly to be published. According to this paper the subgenus *Radiovittaria* includes seven species viz., *V. minima* (Baker) Benedict, *V. Gardneriana* Fée, *V. remota* Fée, *V. stipitata* Kunze, *V. Moritziana* Mett., *V. latifolia* Benedict, and *V. Williamsi* Benedict. The two last mentioned species are to be described in the forthcoming paper. Both are based on material collected in Bolivia by Mr. R. S. Williams of the Garden staff. *V. minima* has only recently been placed in *Vittaria*, the material here included having been previously placed in two other genera.

A. B. Stout.

NOTES, NEWS AND COMMENT.

Mr. Percy Wilson, assistant curator, spent a part of the month of December and January collecting in the provinces of Pinar del Rio and Havana, Cuba.

Mr. W. R. Maxon of the National Museum, Washington, recently spent several days at the Garden in continuation of his work on ferns for North American Flora.

Dr. Charles Thom of the Experiment Station, Storrs, Connecticut, spent a day at the Garden recently, consulting the library.

Dr. B. M. Davis, assistant professor of botany in the University of Pennsylvania, was at the Garden December 19, looking up specimens of *Oenothera* to be used in work on mutation.

Dr. C. B. Robinson, formerly in the employ of the Garden, and for the past three years economic botanist in the Bureau of Science, Manila, has returned and is spending some time at the Garden.

Professor J. C. Arthur and Dr. F. D. Kern spent several days at the Garden the early part of January studying rusts in connection with work on North American Flora.

Mr. R. E. Stone of Cornell University visited the Garden in January to consult the fungous collections with special reference to parasites on leguminous plants.

Among other recent visitors at the Garden were Drs. A. F. Blakeslee and G. P. Clinton of the Agricultural College, Storrs, Connecticut; Professors J. C. Blair and Chalres D. Crandall of the University of Illinois; Dr. E. W. Olive of the State College of South Dakota and Professor R. B. Thomson of the University of Toronto.

Mr. Edward W. Berry, formerly a student of the Garden, has recently published a book (Bulletin No. 3 of the Geological Survey of New Jersey) of 233 pages and 29 plates on "The Raritan Formation." About 100 of the 128 plate figures of fossil plants are reproductions of figures in Newberry's "Flora of the Amboy Clays," the type specimens of which are in the museum of the New York Botanical Garden. Numerous incidental references may also be found to other types and figured specimens in the museum, collected by Dr. Arthur Hollick in Long Island, Block Island and Martha's Vineyard.

The meeting of the various scientific societies of the country at Washington during Christmas week was a notable one and well attended. The botanists had very full programs, as well as a dinner and a smoker, in which between one hundred and

two hundred took part. The Garden was represented by Dr. N. L. Britton, Dr. W. A. Murrill, Professor R. A. Harper, and Mr. A. B. Stout. A movement to unite all American botanical associations under the Botanical Society of America was auspiciously inaugurated. The next meeting of the societies will be held in Cleveland; and the one following in Atlanta.

The Field Museum of Natural History, which has coöperated with the Garden in explorations in the Bahamas, will shortly erect a new museum building costing about five million dollars. The collections will be grouped in it under Anthropology, Botany, Geology, and Zoölogy. The California Academy of Sciences is also to have a new building in time for the Panama Exposition.

A new tropical laboratory for botanical and zoölogical research is soon to be established at Mayaguez, Porto Rico, with Dr. F. L. Stevens as director.

Dr. W. J. Gies, consulting chemist of the Garden and professor of biological chemistry in Columbia University, is one of the editors and has been very active in the establishment of the Biochemical Bulletin, volume I, No. 1 of which appeared recently. This publication which is to appear quarterly, each volume containing about five hundred pages, is the official organ of the Columbia University Biochemical Association for the publication of papers of a biochemical nature. In addition to the publication of biochemical research, some of the aims of the Bulletin are the extension of general biochemical knowledge and to furnish a means of keeping the workers in the home laboratories in closer touch with those who have gone out to other fields of labor. The first number of the bulletin contains 160 pages and is devoted to scientific papers and notes and news of a biochemical nature. One of the papers (pp. 7-41, with three plates) is by Professor Francis Ernest Lloyd and is entitled, "The tannin-colloid complexes in the fruit of the persimmon, *Diospyros*." We understand that the Biochemical Bulletin will aim to give special encouragement to the development of chemical studies in botany and that chemical papers on botanical subjects will be welcomed to its pages. Botanists are accordingly invited to

contribute to the success and usefulness of the Bulletin. Among the editors and collaborators we note the names of the following botanists: Carl L. Alsberg, Gertrude S. Burlingham, E. D. Clark, C. A. Darling, C. Stuart Gager, Benjamin C. Gruenberg, William T. Horne, Homer D. House, J. E. Kirkwood, Elsie A. Kupfer, Burton E. Livingston, Winifred J. Robinson, Fred J. Seaver and A. D. Selby.

Many of the orchids in range 1 are now flowering freely. In house no. 15, next to the large dome, many of the Venus-slippers, represented by the genera *Paphiopedilum* and *Phragmipedium* are in bloom. Among these may be mentioned, as especially attractive, *Paphiopedilum Alcides* and *P. "Wm. McKinley,"* of hybrid origin, and an unusually fine form of *Paphiopedilum insigne*, known as Harefield Hall. The flower of this variety is especially large, with the standard broad and flat and beautifully marked with large spots. It is one of the best of the *P. insigne* forms. Many of the genus *Phragmipedium* are also in bloom. One of these, of hybrid origin, is *P. Cleola*, a pure white flushed with rose, and resembling, in general form, the native white lady-slipper, *Cypridedium reginae*. The rosy flowers of *Laelia anceps*, a Mexican species, are just making their appearance, and the striking *Laelia superbiens*, well described by its specific name, is coming into flower, its bright flowers borne, as in many others of the genus, in bunches at the top of long naked stems. It is a native of Guatemala. In strong contrast to this is *Laelia flava*, of Brazil, with its smaller yellow flowers. A plant of the Javanese orchid, *Vanda tricolor suavis*, with large white flowers spotted with purple, is attractive, not only on account of the beauty of its colorings, but also for its pleasing fragrance. In the far-away Philippines grows *Platyclinis glumacea*. An excellent plant of this is now in full bloom with many long slender drooping racemes of yellowish flowers. *Oncidium Kramerianum*, wild in northern South America, is striking in its coloring of orange and brown. The flower, with its long tail-like petals, is at the end of a long naked stem, resembling much a butterfly at rest, hence its name of the butterfly orchid. There are many other interesting orchids in this house. In house no. 12 are

many plants of the Himalayan, *Paphiopedilum insigne*, in a number of color varieties, now in a profusion of bloom; and next to these a collection of the Andean genus, *Masdevallia*, some of which are now flowering.

Meteorology for December.—The total precipitation for December was 4.09 inches of which 1.48 inches fell as snow. The maximum temperature of 65° was recorded on December 12 and a minimum temperature of 10.5° was recorded on December 5.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

14 specimens of hepatics from Quebec. (Given by Dr. C. B. Robinson.)

4 specimens of mosses from Missouri. (By exchange with Dr. John Davis.)

2 specimens of *Leskea algarvica* from Portugal. (By exchange with Dr. George Roth.)

3 specimens of mosses from Guadeloupe Island, Lower California. (Collected by Dr. J. N. Rose.)

18 specimens of *Andreaea* from Greenland, Sweden and Spitzbergen. (Given by Dr. A. LeRoy Andrews.)

13 specimens of flowering plants from the eastern United States. (Given by Mr. E. E. Steele.)

2 specimens of *Chamaesyce glyptosperma* from Ontario. (Given by Mr. John Dearness.)

1 specimen of *Chamaesyce* from Italy. (Given by Dr. N. L. Britton.)

1 specimen of *Kneiffia Sumstinei* from Pennsylvania. (By exchange with the Carnegie Museum, Pittsburgh, Pennsylvania.)

2 specimens of *Linaria Linaria* from Ontario. (Given by Mr. William Scott.)

2 specimens of mosses from Saguenay County, Quebec. (Given by Dr. C. B. Robinson.)

4 specimens of *Riccia* from Connecticut. (Given by Miss Annie Lorenz.)

4,500 specimens from Cuba. (Collected by Dr. J. A. Shafer.)

1 specimen of *Parthenium Hysterophorus* from Louisiana. (Given by Mr. E. C. Wurzlow.)

1 specimen of *Festuca octoflora* from Alabama. (Given by Dr. R. M. Harper.)

60 specimens of ferns from eastern North America. (Distributed by Dr. Philip Dowell.)

2 specimens of fungi from Siberia. (Given by the United States Department of Agriculture.)

3,700 specimens of fungi from Washington, Oregon and California. (Collected by Dr. and Mrs. W. A. Murrill.)

11 specimens of ferns from the vicinity of New York City. (Given by Dr. Philip Dowell.)

86 herbarium specimens from British America. (By exchange with the Geological Survey of Canada.)

2 herbarium specimens from New York. (Given by Mr. K. P. Janson.)

49 specimens of flowering plants from Colorado. (By exchange with Mr. George E. Osterhout.)

4 specimens of fungi from North America. (By exchange with Professor J. C. Arthur.)

164 herbarium specimens from British Columbia and Hudson Bay. (By exchange with the Geological Survey of Canada.)

4 specimens of Amaranthaceae from Ohio. (By exchange with Professor John H. Schaffner.)

2 specimens of *Xanthium* from Colorado. (By exchange with Professor J. C. Arthur and Dr. F. D. Kern.)

5 specimens of *Potentilla*. (By exchange with the Seed Laboratory, Ottawa, Canada.)

48 specimens of mosses from Washington and Oregon. (By exchange with Professor A. S. Foster.)

407 specimens from St. Eustatius, Saba and St. Martin, West Indies. (By exchange with the Botanical Garden, Utrecht, Holland.)

PLANTS AND SEEDS.

12 plants for conservatories. (By exchange with National Museum, through Dr. J. N. Rose.)

2 plants of *Agave*. (Given by Mrs. C. Cole Bradley.)

3 plants of *Campanula isophylla*. (Given by Mrs. N. L. Britton.)

1 plant of *Primula*. (Given by Dr. H. H. Rusby.)

1,260 lily bulbs for decorative plantations. (Purchased.)

1 plant of *Cycas revoluta*. (Given by Mrs. J. H. T. Stempel.)

6 plants of *Cordyline australis*. (Given by Mr. H. Schniewind, Jr.)

3 orchids for conservatories. (By exchange with Messrs. Lager & Hurrell.)

2 plants for conservatories. (By exchange with Messrs. Knight & Struck.)

6 orchids for the conservatories. (By exchange with Mr. J. A. Manda.)

66 plants for conservatories, derived from seeds from various sources.

2 packets of seeds of Manihot. (Given by Mr. F. H. Hunicke.)

1 packet of seed. (Given by Dr. H. H. Rusby.)

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EDITOR

FRED J. SEAVER

Curator

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P. O. F. X.

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CHARLES FINNEY COX.

Charles Finney Cox, Treasurer of the New York Botanical Garden since 1899, an original member of the Corporation, and a member of the Board of Managers since the formation of that Board in 1895, died at his residence, No 5 Delavan Terrace, Yonkers, N. Y., on Wednesday, January 24; he was a little more than sixty-six years old, having been born on Staten Island, January 16, 1846. He studied at the College of the City of New York, and subsequently at Oberlin College, where he obtained the degree of A.B., and that institution, of which he was later a trustee, subsequently conferred upon him the honorary degree of A.M. Lafayette College awarded him the degree of LL.D. in 1911.

Mr. Cox had a keen appreciation of the progress of modern science, and for a man not professionally within the scientific ranks, an extraordinary knowledge of its details in many branches. He was a member of many learned societies and an officer of several from time to time, having been president of the New York Microscopical Society in 1888; of the Council of the Scientific Alliance of New York from 1891 to 1906; of the New York Academy of Sciences 1908 and 1909, treasurer of that body for several years previously, and again accepted the duties of that position in December, 1911.

Microscopy was his favorite subject for personal investigation, and his studies with the microscope of plant and animal life extended over many years; the instrument itself, and the history of its development and perfection were of great interest to

him from the standpoint of the wonderful additions to knowledge obtained by its use, and their applications to the welfare of mankind. This acquaintance with the facts and methods of microbiology made him, most fittingly, the first chairman of the Charity Organization Society's Committee on the Prevention of Tuberculosis, following the discovery of the bacillus which causes that human affliction, the vast importance of which he at once recognized; his service, in this position, has been of inestimable value to humanity. To all the work of the Charity Organization Society he rendered signal service over a long period of time, accepting membership on many of its important committees.

A close and critical student of the facts and observations on which the theory of evolution is based, he formed one of the most complete collections of Darwiniana ever brought together. In 1909 he represented the New York Academy of Sciences at the centennial celebration of Darwin's birth, held at Oxford, England, and he has spoken of this as one of the most interesting episodes of his life.

He was one of the incorporators of the New York Botanical Garden, named in the charter granted by the Legislature in 1891, and had previously been active in advocating the establishment of the institution. The subscription of the guarantee fund required by this charter was successfully accomplished, largely through his efforts; he became a member of the Board of Managers at its formation on February 12, 1895, and his service in that capacity has been continuous; at the annual meeting in January, 1899, he was elected treasurer, and this position he has held ever since, besides serving on the finance committee and the executive committee; his advice and counsel have been of the wisest and always helpful. The Garden has received important gifts from him, including his collection of microscopes, illustrating the history of that instrument, many books on microscopy and botany, and contributions to its funds.

When we consider that all these public services were given freely, while he was continually engaged in the most confining type of a business career as the manager of vast financial in-

terests, we can but wonder how it was possible; he was modest and unassuming in all his relationships, a most lovable character, and a perfect gentleman.

WHEREAS, Charles Finney Cox, one of the original promoters of the New York Botanical Garden, and its Treasurer from 1899 until his recent death, departed this life on January 24, 1912, after long and faithful service.

Resolved: That the Board of Managers, mourning his untimely death, hereby places on record its appreciation of his noble, manly character; his engaging personal qualities; his invaluable services to this institution during so many years; his zeal and intelligent interest, amid many pressing business cares, in the progress of natural science; his own personal studies and able contributions therein; and his devotion and ready assistance at all times by counsel, advice and pecuniary means towards the successful development of the Garden enterprise.

Resolved: That in his death, we mourn the loss of an invaluable associate and an endeared friend, and that we extend our sympathies to his bereaved family, to whom a copy of these resolutions is directed to be sent.

The foregoing memorial and resolutions were approved by the Board of Managers of the New York Botanical Garden, at a meeting held January 30, 1912.

N. L. BRITTON,
Secretary.

BOTANICAL EXPLORATION IN CUBA.

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF,

Sir: The following brief report on botanical exploration on the Sierra de Anafe, a small mountain range in the province of Pinar del Rio, Cuba, between Caimito and Guanajay, is here presented.

Sailing from New York on December 9, I arrived at Havana on the morning of the 13th, and the following day, accompanied by Brother Léon of the Colegio de la Salle, Vedado, went by rail to Guayabal which is at about the center of the range. We

were very hospitably received at the home of Mr. Arthur Shaler Williams, where I made my headquarters during my stay of a little over two weeks. Having, on several occasions, the kind coöperation of Brother Léon and the comfortable quarters at Mr. Williams', my work was greatly facilitated.

The tree-like cactus of this region, a species of *Leptocereus* (*L. Leoni*), was observed only on the southern slope. A small colony containing several large individuals, one of which was fourteen feet tall, was found on December 19 on a hillside near Caimito, and an excellent wood section from one of these specimens was prepared for the museum. The bark of this species is very thin and of a grayish-green and unlike many other castuses, the wood is very heavy and close-grained. Many individuals were carefully examined for flowers and fruits, as these are rather imperfectly known, but, unfortunately, the plants were neither in flower or in fruit at this season. A species of *Selenicereus*, a vine-like cactus, was also collected, together with specimens of a species of *Agave*, which bore showy yellow flowers.

Another floral feature of the range is a species of *Thrinax* (*T. punctulata*), which is confined to the jagged rocky slopes and perpendicular cliffs on the north side. Specimens from five to thirty-five feet tall were growing from the shallow pockets of some of the cliffs. The observer can but wonder how these palms, with apparently so insecure a foothold on the sides of such vertical walls, have been able to withstand the severe storms that occasionally sweep across the island.

Of the shrubs, *Myginda uragoga*, a member of the Staff-tree family, and a plant which appears to be of rather local distribution in Cuba, was frequently seen on the cool, shaded slopes, also hanging from the faces of the cliffs. On some of the more exposed hillsides, a *Malpighia* (*M. cubensis*), is very plentiful. This species, together with a variety of other shrubs, forms a dense thicket through which one is obliged to proceed with great caution. Many of the stinging, needle-like hairs that are appressed to the under surface of the leaves soon found a lodging place and caused me much discomfort.

Several apparently uncommon species of *Passiflora* were found

in the dense hillside thickets, the fruit of one of these being much sought after by birds.

Between the two ridges the surface is relatively flat and for the most part used for pasture-lands, or is under cultivation. In the vicinity of small habitations two familiar weeds, the pepper-grass (*Lepidium virginicum*) and the common plantain (*Plantago major*), are established.

This entire range was thoroughly explored between December 14 and January 1, and the collection obtained here will undoubtedly prove of much interest.

Returning to Havana on the afternoon of January 1, I visited the following day the valley of the Rio Bacuranao in company with Brother Léon, and on the 3d, we had the pleasure of his colleague, Brother Victorin's, company to Cumbre Hermosa, where several plants not represented in our herbarium from the province of Havana, were obtained.

The afternoon of January 4 was given to exploration of the Jata Hills at Guanabacoa, where many interesting small grasses were found, and several shrubs among which were two species of *Malpighia*, and an *Erythroxylon* (*E. alaternifolium*) which grew very plentifully.

The large collection of plants brought together by Dr. J. A. Shafer during November and December, in the extreme western part of the province of Pinar del Rio, was placed in my care at Havana, and included with my collection which I brought through to New York on January 9.

Respectfully submitted,

PERCY WILSON,

Assistant Curator.

THE FLOWERING OF THE JAMAICA CANDLE-WOOD TREE.

Among some of the rare and little-known species brought from the West Indies by the various expeditions of the Garden, and installed in the living-plant collections, are a number of specimens of the Jamaica candle-wood (*Peltostigma pteleoides*), one of which flowered at Conservatory Range 2, on January 6, 1912.

This plant, a member of the Rue family, was discovered on the Santa Cruz Mountains, Jamaica, by William Purdie in 1844, who was making a botanical collection for the Royal Gardens at Kew, and plants grown from seed collected by him flowered there in February, 1849. In his Icones Plantarum, Sir William Hooker described and figured (*plates 698* and *699*) this new plant under the name of *Pachystigma pteleoides*. As the name *Pachystigma* had been used for a South African genus in the Madder family, Hooker's plant was renamed two years later by Walpers as *Peltostigma pteleoides*. Subsequent collectors in Jamaica failed to find this species until its rediscovery, after a long search, by Dr. N. L. Britton and Mr. William Harris in September, 1907, on a wooded hill at Potsdam, on the Santa Cruz Mountains, probably the original locality, at about 2,600 feet elevation. The trees were in young fruit at the time of their visit, and numerous seedlings were obtained from which the specimens at the Garden were grown.

The Jamaica candle-wood, or ptelea-leaved peltostigma is a slender tree, sometimes attaining a height of eight meters. The leaves are alternate, the dark-green leaflets usually three, and closely resemble those of the hop-tree, *Ptelea trifoliata*, a native of the United States, sometimes grown in our parks. The flowers are an inch or more in diameter and sweet-scented, with the petals of a creamy white and nearly equal, and the sepals deciduous and unequal, the interior ones large and somewhat petal-like, the outer smaller. The stamens are numerous and inserted on a thick, fleshy disk, and the ovary is covered with short hairs giving it a velvety appearance. This species appears from the history of the living material at Kew and here to flower when at the age of five years.

Herbarium specimens from southern Mexico and Guatemala from altitudes up to 5,500 feet appear identical with the Jamaica plant.

PERCY WILSON.

CONFERENCE NOTES.

The January conference of the scientific staff and registered students of the New York Botanical Garden was held in the laboratory of the Museum Building, Monday, January 15, at 4 P. M.

A general synopsis of the work on the mosses for the first part of Vol. 15 of North American Flora, was presented as follows:

1. Sphagnaceae, Dr. A. Le Roy Andrews	100 species reduced to	37
2. Andreaeaceae, Miss Julia T. Emerson	12 species reduced to	11
3. Archidiaceae, Mrs. N. L. Britton	8 species reduced to	4
4. Dicranaceae, Mrs. Britton and R. S. Williams:		
1. Bruchiaeae, Mrs. N. L. Britton	22 species reduced to	20
2. Ditricheae, Mrs. N. L. Britton	19 species enlarged to	25
3. Bryoxiphieae, Mrs. N. L. Britton	1 species enlarged to	2
4. Seligerieae, Mrs. N. L. Britton	6 species enlarged to	9
5. Dicranelleae, Mr. R. S. Williams	55 species reduced to	29
6. Rhabdoweisieae, Mr. R. S. Williams	2 species	2
7. Dicraneae, Mr. R. S. Williams	230 species reduced to	117
5. Leucobryaceae, Mr. R. S. Williams:		
1. *Leucobryum*	26 species reduced to	8
2. *Leucophanes*	3 species reduced to	2
3. *Octoblepharum*	5 species reduced to	3

Dr. A. Le Roy Andrews, of Cornell University, stated that the number of species of *Sphagnum* recorded for North America had been increased from 19 listed by Lindberg in 1882 to 100 in Warnstorf's treatment in Pflanzenreich, just issued. After critical studies and comparisons with W. I., C. and S. A. forms, he had been able to reduce this number to 37 species and 8 varieties. He also stated that "With reference to nomenclature, where the facts seemed clear he has followed the principle of priority starting with Linnaeus, involving the adoption of 6 old names only, and no new changes are made."

Miss Julia T. Emerson followed with notes on *Andreaea* in which she stated that 4 species of this genus had been recorded by Lesquereux and James in 1884. This number had been increased to 12 since, which she had been able to reduce to 10 and added one new species from Toccoa Falls, collected by Dr. Small.

Mrs. Britton stated that in the genus *Archidium* the species

resemble each other so closely that it is difficult to separate them but that there seemed to be little doubt that of the 8 species listed for N. A. only 4 could be clearly distinguished.

The Dicranaceae including 33 genera and 204 species have been arranged for the sake of convenience in the sequence of Engler and Prantl Pflanzenfamilien, though a few changes and additions have been recorded; notably the addition of *Pringleella* from Mexico. This family has required a great deal of critical study and many comparisons have been made including much sectioning of leaves and reduction of species. In most cases original specimens have been seen and our thanks are due to Professor Macoun for enabling us to study all of Kindberg's species. Mr. Williams has devoted much time and labor and skill to making sections and slides of the more critical species and will be prepared to print drawings of many of these should it become desirable.

When printed, this part will include 5 families, 38 genera and 269 species as at present recorded.

A. B. Stout.

PUBLICATIONS OF THE STAFF, SCHOLARS AND STUDENTS OF THE NEW YORK BOTANICAL GARDEN DURING THE YEAR 1911.

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Arthur, J. C. New Species of *Uredineae*—VII. Bull. Torrey Club **37**: 569–580. *f. 1.* 11 Ja 1911;—VIII. Bull. Torrey Club **38**: 369–378. 21 Au 1911.

Barnhart, J. H. Report of the librarian. Bull. N. Y. Bot. Gard. **7**: 324–347. 16 Mr 1911.

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——— *Opuntia Traceyi* sp. nov. Torreya **11**: 152. 19 Jl 1911.

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——— Some recent University of California publications. Torreya 11: 176–180. 14 Au 1911. (Reviews.)
——— The plant photograph exhibit. Jour. N. Y. Bot. Gard. 12: 218–230. O 1911.
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NOTES, NEWS AND COMMENT.

Dr. Roland M. Harper recently spent several days at the Garden following his return from a ten months stay in Alabama.

Dr. David R. Sumstine, of Pittsburgh, has been awarded a research scholarship for the month of July to enable him to continue his researches on certain groups of imperfect fungi.

Dr. E. P Meinecke, forest pathologist in the Bureau of Plant Industry, and at present stationed at San Francisco, California, recently spent several days at the Garden consulting that part of the mycological herbarium relating to the diseases of forest trees.

At a meeting of the Board of Managers, held January 30, 1912, Mr. James A. Scrymser was elected Treasurer of the New York Botanical Garden to succeed Mr. C. F. Cox. Mr. Scrymser has been Chairman of the Finance Committee of the Board of Managers since the organization of the Garden, and by his acceptance of the office of Treasurer continues and supplements his valuable services to the institution.

Professor R. A. Harper has given to the Garden his collection of California fungi consisting of 232 numbers, made during the winter and spring of 1911, while he was at the University of California. A large majority of the specimens are polypores or

gill-fungi. The latter are also represented by a collection of about 60 excellent photographs secured by Professor Harper some years ago at Berkeley.

Among recent visitors at the Garden were Dr. Charles Brooks, of New Hampshire State Agricultural College, Dr. Mel. T. Cook, of Rutgers College, New Jersey, and J. M. Greenman, assistant curator in the Field Columbian Museum, Chicago.

In house no. 4, conservatory range 1, on a post near one of the columns, is a woody vine, now in bloom, known to botanists as *Norantea guianensis*. This is growing vigorously, its long rambling branches reaching out in all directions for support, following its native habit of growing on trees. On the end of some of these branches is a long inflorescence, looking at a distance like a thick red rod. A closer inspection, however, will reveal that this is made up of numerous rather insignificant flowers, borne mainly upon the upper side of the axis, each pedicel bearing at its apex a pendulous body over an inch long. This is attached by a short slender stalk, the remaining portion being a curved hollow cylinder. This organ is technically known as a bract, and it is these bracts which make the inflorescence so conspicuous and showy. Their use to the plant is problematic.

This vine is a native of Guiana and northern Brazil, and is one of the fourteen species comprising the genus *Norantea*, all with the exception of one species on the island of Guadeloupe, confined to tropical continental America, the greater number being peculiar to Brazil. They are either trees or vines with spirally arranged leaves. The flowers are inconspicuous, as compared with the large showy bracts, which are either saccate or spoon-shaped.

The genus *Norantea* is one of five genera comprising the *Marcgraviaceae*, a family of plants confined to the tropics of America. Most of the other species belong to the genus *Marcgravia*, also mainly confined to the tropics of continental America. Of the sixteen known species three are found in the West Indies. One of these, *M. oligandra*, is confined to Cuba, another, *M.*

Sintenisii, is known only from Porto Rico, and the third, *M. umbellata*, occurs in both the West Indies and Brazil. Specimens of the two last mentioned will be found at conservatory range 2. These are sometimes known as the West Indian ivy, from the habit of the sterile branches clinging closely to the bark of trees, or to the faces of cliffs, much after the manner of the ivies of temperate regions.—*Geo. V. Nash.*

Meteorology for January.—The total precipitation recorded for the month was 2.44 inches of which 1.25 inches fell as snow. Maximum temperatures were recorded of 53° on the 23d, 49° on the 19th, and 42° on the 3d and 9th. Minimum temperatures were recorded of −6° on the 12th, 3° on the 16th, 5° on the 7th and 5.5° on the 28th.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

1,083 specimens from western Cuba. (Collected by Mr. Percy Wilson.)

65 museum specimens of marine algae from California. (Collected by Mr. H. B. Snyder.)

2 specimens of mosses from the Everglades, Florida. (By exchange with Mr. George B. Kaiser.)

1 specimen of *Thelia hirtella* from Greencastle, Indiana. (By exchange with Professor Howard J. Banker.)

200 specimens "Fungi Columbiani," fascicles 35 and 36. (Distributed by Mr. Elam Bartholomew.)

5 specimens of ferns frcm tropical America. (By exchange with Mr. C. Belhette.)

2 specimens of *Oenothera grandiflora* from Alabama. (By exchange with Professor Bradley M. Davis.)

12 specimens of mosses from North America. (By exchange with the United States National Museum.)

72 specimens from British Columbia and the Hudson Bay region. (By exchange with the Geological Survey of Canada.)

3,748 specimens from western Cuba. (Collected by Dr. John A. Shafer.)

40 specimens of mosses from the Southern States. (Given by Dr. John K. Small.)

148 specimens from New Mexico and Arizona. (By exchange with the United States National Museum.)

37 specimens of hepatics. (By exchange with Mr. Franz Stephani.)

25 specimens of fungi from Lafayette, Indiana. (By exchange with Professor J. C. Arthur.)

20 specimens of fungi from the Isle of Pines. (By exchange with the Carnegie Museum.)

8 specimens of fungi from North Carolina. (By exchange with Mr. E. R. Memminger.)

2 specimens of fungi from Toronto, Canada. (By exchange with Mr. Thomas Langton.)

1 specimen of *Hapalopilus gilvus* from California. (By exchange with Professor C. F. Baker.)

4 specimens of polypores from Trinidad. (By exchange with Mr. J. B. Rorer.)

3 specimens of fleshy fungi from Hope Gardens, Jamaica. (Given by Mr. William Harris.)

2 specimens of fungi from Colorado. (Given by Professor Ellsworth Bethel.)

1 specimen of *Calyptospora Goeppertiana* from Oregon. (Given by Dr. H. D. House.)

4 specimens of fungus from Seattle, Washington. (By exchange with Mr. S. M. Zeller.)

35 specimens, "Ascomycetes," fascicle 49. (Distributed by Dr. Heinrich Rehm.)

1 specimen of *Stictis radiata* from Ohio. (By exchange with Dr. Bruce Fink.)

PLANTS AND SEEDS.

2 orchids for the conservatories. (By exchange with Mr. J. A. Manda.)

2 palms. (Given by Mrs. N. L. Britton.)

40 Cuban plants. (Collected by Dr. J. A. Shafer.)

14 cactuses. (By exchange with U. S. National Museum, through Dr. J. N. Rose.)

114 orchids. (By exchange with Messrs. Lager & Hurrell.)

4 plants derived from seed.

4 packets Mexican seed. (Given by Dr. Francis C. Nicholas.)

1 packet of Cuban seed. (Given by Brother Léon.)

1 packet of seed of *Aloe hereroensis*. (By exchange with Dr. Paul Range.)

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OF

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EDITOR

FRED J. SEAVER

Curator

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JOURNAL

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The New York Botanical Garden

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THE LETCHWORTH PARK ARBORETUM.

All interested in forestry and the conservation of our forest areas will be glad to read the article, entitled "A Great Living Tree Museum," which appeared in the February issue of the Review of Reviews. This is by Chas. M. Dow, trustee of the American Scenic and Historic Preservation Society, and director of Letchworth Park and Arboretum. This undertaking is to be known as the Letchworth Park Arboretum, and will be laid out on broad lines, as indicated in the following quotation from the article referred to: "The principle upon which the Letchworth Park Arboretum is established is that it shall consist of a permanent collection of the various species of the world's timber trees likely to thrive in this northern climate, planted scientifically, to test their value and illustrate the processes of development, so supplying not only knowledge for knowledge's sake, but also knowledge for practical use."

Of the one thousand acres comprising Letchworth Park, about five hundred are open meadows and fields, long under cultivation, and it is here that the arboretum is to be established. It is planned to devote irregular blocks, an acre or more in extent, to one or more kinds of trees of commercial importance. Due regard will be had for landscape and color effects, and the planting will be so close as to rapidly establish forest conditions. And when this condition is reached, here will be a place where the economic timber trees of temperate regions the world over may be studied, and their value to this country determined. It is difficult to estimate the worth of a collection of this kind or of its

value to forest interests. Careful statistics and records are to be kept, placing at the disposal of all, through publications, reliable facts to guide in reforestation. Mr. Dow perhaps expresses this best when he says: "The growth of the trees will be measured periodically, their liability to disease will be noted and their capacity for seed bearing, their behavior in pure stands and in mixture, their influence upon the forest floor, and other practical considerations bearing upon their value for commercial tree planting will be carefully observed and recorded." The establishment of the arboretum will be in the hands of Overton W. Price, of Washington, D. C., vice-president of the National Conservation Association, and for ten years associate forester of the United States.

And all of this has been made possible by the generosity and public spirit of one man, the late Hon. William Pryor Letchworth, who as early as 1859 began the acquisition of land in the vicinity of the Upper Falls of the Genesee. His purchases continued until he secured control of both sides of the Genesee for a distance of about three miles. This tract, which includes the three great falls and the wonderful Portage Gorge, and has been greatly improved during his ownership, was presented by Mr. Letchworth in 1907 to the state of New York, he retaining only a life-tenancy in the estate, which was terminated at his death on December 1, 1910. A condition of the gift was that the permanent custody of the property should be with the American Scenic and Historic Preservation Society, which is now directing its development.

Mr. Letchworth was ever desirous of being of service to his fellow man, and to make the park of greater educational value, desired to have the trees properly labeled. In the fall of 1907 the Director of the New York Botanical Garden was consulted in this matter, with the result that the writer was selected to make a study of the arboreal vegetation of the tract. The form of tree label used in the New York Botanical Garden was approved by Mr. Letchworth, and in the following year a second visit was made to superintend the affixing of a number of these labels. These visits were fully enjoyed, for Mr. Letchworth

was a gentleman of the old school, kind and courteous, and made one feel fully at home. A series of photographs was secured during the second visit, and these used in illustrating a lecture given by the writer at the New York Botanical Garden on October 31, 1908, an illustrated account of which appeared in this JOURNAL for November of the same year. For a detailed account of the establishment of Letchworth Park and of the writer's impressions of this wonderfully beautiful and picturesque region, the reader is referred to that article.

GEORGE V. NASH.

THE CHESTNUT CANKER CONVENTION.

A convention called by Governor Tener to consider ways and means of fighting the chestnut canker was held at Harrisburg, Pennsylvania, February 20 and 21. A large number of delegates were present, representing practically all of the states where the chestnut tree grows naturally in this country, and the papers and discussions brought out much valuable information.

The method of control adopted by the Pennsylvania Commission is that outlined in Farmers Bulletin 467 of the United States Department of Agriculture, which recommends the cutting out of infected trees and the establishment of an immune zone. Several pathologists present endeavored to show that this method has not been sufficiently tested, and that the only proper way in which appropriations may be spent is in the scientific investigation of the disease with the hope that some effective method of control may yet be discovered, and in aiding state surveys to locate the disease for the information of timber owners. The resolutions adopted by the convention, however, favored a campaign in all of the states affected similar to that already begun in Pennsylvania, which combines scientific investigation and the cutting out method.

It seems to the writer that the only proper procedure for the other states is to make surveys, with the aid of small appropriations if necessary, and to await the results of the scientific

experiments and tests already being carried on in Pennsylvania and backed up by ample funds. To appropriate large sums to duplicate these experiments or to apply a method of control which has not been tested and which is pretty certain to fail, would be unwise to say the least. If scientific research has any practical method of control in store for us in the near future, it will be much easier to obtain money to put it into operation if we proceed wisely now, and do not waste our public funds on a visionary and impracticable scheme.

Owners of chestnut timber in any state are advised to make the best possible use of the present growth, for it may be the last. This timber represents money and you should stand on your rights and demand a very good reason before allowing the summary destruction of this timber or the impairment of its value by a glut of the market. Utilization is the big issue. See that you are advised of the progress of the disease, appropriating money for this if necessary, and market your timber as it approaches. Be business-like and accept the inevitable in time to make the best of it.

Owners of chestnut orchards anywhere within the affected area are advised to give up at once the idea that these orchards can be saved by treatment. If the soil is suitable for apples or other fruit trees, it would be well to plant these at once between the rows. Those who have chestnut trees for shade or ornament on their lawns are advised to replace them with other trees as soon as they become unsightly. There is no known method of saving a chestnut tree after it is once attacked by the canker, and money spent in an attempt to do this would be simply thrown away.

The writer's reasons for believing that the canker cannot be controlled in the forest by the cutting out method are as follows:

Why the Chestnut Canker Cannot be Controlled.

1. It is impossible to locate all advance infections, these not being apparent even under close inspection.

2. It is practically impossible to cut down and burn all infected trees after their discovery.

3. Even if these trees are cut, it is impossible to discover and eradicate the numerous infections originating from millions of spores produced on these trees and distributed by birds, insects, squirrels, wind, and rain.

4. Even if it were possible to cut and burn all affected trees, for ten to twenty years afterwards numbers of sprouts would grow up from the roots of these trees and continue to die from the disease and to spread the infection.

5. Supposing that it might be possible to eradicate all advance infections, what method is proposed that is at all feasible for combating the disease in its main line of advance? All of the foresters connected with the United States Government and the entire Army of the United States would be utterly powerless to oppose its progress.

6. Although the chestnut canker has been known and experimented with since 1905, there is not a single instance where an individual tree or a grove of trees affected by the disease has been saved. If it is impossible to combat the canker under the most favorable circumstances, how would it be possible to succeed with an extensive forest? The published account of the extermination of the chestnut canker in the vicinity of Washington, D. C., cannot be relied upon. The trees most conspicuously affected there have been cut and burned, so that the presence of the disease is not readily apparent, but with each season additional trees will be affected and the attempt to stay the disease will be abandoned, especially when the main line of advance, which is now in northern Maryland, reaches the Potomac River.

The following suggestions for further scientific investigation of the disease were made by the writer:

Questions for Scientific Investigation.

1. The vitality of the spores, both summer and winter forms.
2. The vitality of the mycelium in the bark and wood.
3. The vitality of sprouts and their bearing on the question.
4. The food of the fungus; the decomposition of tannin by ferments.

5. Distribution. A large subject, involving experiments and observations over wide areas and dealing with winds, rain, insects, birds and their migration, squirrels, the transportation of wood, railway ties, etc.; rate and direction of distribution; nursery stock; trees in foreign countries; effects of coppicing.

6. Origin. Nothing is known at present. Is it native or foreign? Why was it unknown until recently, and then why so violent?

7. Will it attack other trees besides species of chestnut? Much depends on this. Trees nearest the chestnut should be used for experiment.

8. What is the future of the disease? Will it run its course and disappear? Will it become less virulent? Will resistant varieties appear? Can such varieties be made by selection, hybridization, etc.? Can chestnuts be grown with safety beyond the Mississippi river? How long after the death of all our trees may chestnuts be again planted with safety?

9. Can we expect natural enemies to arise? If it were an insect disease, this might be looked for with more hope.

10. Can a method of control be discovered by further scientific research? Most remedies suggested by unscientific persons are known at once to be valueless and need not be tried. One thing is certain, the more one knows about a disease, the more liable one is to discover a remedy. If none is possible, the sooner this fact is known, the better for all concerned.

W. A. MURRILL.

CONFERENCE NOTES.

The February conference of the scientific staff and registered students of the Garden was held in the laboratory on February 5.

Dr. Murrill gave a general account of the flora of the different localities visited, with specimens of some of the plants and views illustrating scenery, forests, educational institutions, and other matters of interest. He also exhibited a number of specimens of fungi collected; illustrating especially the groups which had been worked over since his return. A paper on the Polyporaceae

and Boletaceae prepared for MYCOLOGIA includes twenty-four known species of polypores and eight species new to science. The Boletaceae collected by him comprise four known species and four new ones. These were all exhibited and some of their principal characters noted. A number of specimens of *Lactaria* and *Russula*, worked over by Miss Burlingham, were exhibited and the percentage of undescribed forms was found to be very large. Colored sketches of a number of fleshy fungi of special interest, made by Mrs. Murrill, were exhibited to give an idea of the difference in the fungous flora of the west as compared with that of the eastern United States. A rather detailed general account of this expedition was published in the January number of the JOURNAL.

Mr. Fred J. Seaver called attention to a number of cup-fungi and Pyrenomycetes collected by Dr. Murrill on the Pacific coast. Three species of the order Hypocreales were shown, all of which represent extensions of our known range of distribution. One cup-fungus belonging to the genus *Aleuria* was collected which has been seldom collected in this country, a specimen from Alabama being the only other representative of the species in our collections from North America. Also one cup-fungus belonging to the genus *Lachnea* was collected which may prove to be undescribed. A number of common species were also shown.

A. B. STOUT.

NOTES, NEWS AND COMMENT.

Dr. Ezra Brainerd, of Middlebury College, Vermont, has recently spent several days at the Garden in continuation of his studies on the violets of North America.

Mr. R. Heber Howe, teacher of natural science in Middlesex School, Concord, Massachusetts, and formerly a research student at the Garden, recently received his doctorate from the University of Paris.

Dr. N. L. Britton opened a public lecture course at the College of the City of New York at 4 o'clock on the afternoon of Thursday, February 8th, the subject being "Scenic and Floral Features of Cuba."

Miss Adeline Ames, a graduate student at Cornell University, spent the month of February at the Garden studying the collection of Polyporaceae with special reference to the species occurring in the United States.

The collection of gill-fungi belonging to the herbarium of Stanford University, California, has been sent to the Garden for study. A large number of duplicates will be retained and added to the mycological herbarium.

Dr. N. L. Britton, director-in-chief, attended the exercises in commemoration of the one hundred and twenty-fifth anniversary of the University of Pittsburgh on February 28; and was honored with the degree of Doctor of Laws as an "eminent botanist and director-in-chief of the New York Botanical Garden," together with certain other "representatives of various institutions and individuals who have rendered distinguished services to the cause of learning and to humanity."

A collection of fleshy fungi from Sendai, Japan, has been received from Professor A. Yasuda. This is of special interest in connection with the study of species found on the Pacific coast, and may aid in determining the relationships existing between our far western flora and that of certain parts of Asia.

Number 27, volume 8, of the Bulletin of the New York Botanical Garden was issued March 14, 1912. This number which consists of eighty-eight pages contains the report of the Director-in-Chief and other official documents.

Dr. W. A. Murrill represented the Garden at the convention called by the Governor of Pennsylvania at Harrisburg, February 20 and 21, to consider ways and means of preventing the spread of the chestnut canker.

Dr. William Trelease has resigned the directorship of the Missouri Botanical Garden, which position he has held since the death of its founder, Henry Shaw, in 1889.

Dr. and Mrs. N. L. Britton, accompanied by Mr. J. F. Cowell, director of the Buffalo Botanic Garden, sailed March 2 for Cuba, where several weeks will be spent in botanical exploration.

The first number of the Brooklyn Botanic Garden Record,

issued for January of this year, contains an interesting account of a visit of exploration to Cuba made by Dr. C. Stuart Gager, the director, last autumn. It also contains the articles of agreement between the City of New York and the Brooklyn Institute of Arts and Sciences concerning the Brooklyn Botanic Garden.

A comprehensive project for research on the Cactaceae has been organized by the department of botanical research of the Carnegie Institution of Washington. Dr. J. N. Rose, of the U. S. National Museum, who has explored much of the region inhabited by these plants in Mexico and the United States and published extensively on the family, has been appointed research associate. He has been granted a furlough from the museum, which also furnishes working quarters and facilities for handling the living collections. Dr. N. L. Britton, who began organizing a collection of cacti in the New York Botanical Garden in 1900, and has since made extensive studies of the group, has also been appointed research associate, without salary. By the action of the scientific directors of the garden he will be given some respite from other duties to enable him to participate in this work. The garden also contributes its extensive collections, and some of its explorational effort to the project. Dr. D. S. Johnson, of Johns Hopkins University, will spend several months in 1912 on the morphology and physiology of the fruits of the group, and Professor J. G. Brown, of the University of Arizona, will continue his studies on the general morphology of *Opuntia* and *Carnegiea* begun while acting as assistant at the Desert Laboratory. Other contributions will be made by the members of the staff and coöperators of the Desert Laboratory.—From *Science*.

On the evening of February 13, Dr. Forrest Shreve, of the staff of the Desert Laboratory of the Carnegie Institution of Washington, delivered before the Torrey Botanical Club a very interesting and instructive illustrated lecture on "Some Botanical Features of a Desert Mountain Range."

In continuation of exchanges of herbarium and museum specimens, the Garden last December sent to the Muséum National d'Histoire Naturelle at Paris a consignment of 185 specimens of

North American marine algae, including a series of unsegmented Corallinaceae. In addition to letters of appreciative acknowledgment from the botanists more immediately interested, this sending was met by a special vote of thanks of the professors of the Museum, which has been communicated by M. Edmond Perrier, the Director of the Museum, in the following note:

MUSÉUM NATIONAL D'HISTOIRE NATURELLE

PARIS, le 22 janvier 1912

Monsieur: L'Assemblée des Professeurs du Muséum national d'Histoire naturelle me charge de vous adresser ses remerciements pour les deux importantes séries d'algues marines et d'algues calcaires en très beaux spécimens dont vous avez bien voulu enrichir les collections de notre service de cryptogamie.

Veuillez agréer, Monsieur, l'assurance de mes sentiments les plus distingués.

Le Directeur du Muséum

Membre de l'Institut de France et de l'Academie de Médecine,

[Signed] EDMOND PERRIER.

Monsieur Marshall Howe, New-York Botanical Garden, Bronx Park à New-York.

Meteorology for February.—The total precipitation recorded for the month was 1.98 inches. Maximum temperatures were recorded of 41° on the 2d, 48° on the 17th, and 62° on the 25th. Also minimum temperatures were recorded of 0° on the 10th, 7° on the 13th, and 10° on the 5th.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

7 specimens of mosses from Connecticut. (Given by Dr. George E. Nichols.)

24 hepatics from the United States. (Given by Miss Caroline C. Haynes.)

3 specimens of *Holomitrium* from South America and Hawaii. (By exchange with Professor V. F. Brotherus.)

3 specimens of drug-plants. (Given by Dr. H. H. Rusby.)

21 specimens of marine algae from Pacific Grove, California. (Given by Mr. H. B. Snyder.)

4 specimens of the rootstocks of *Discovea* from the eastern United States. (Given by Mr. H. H. Bartlett.)

20 specimens "American Hepaticae," Decades IX, X. (Given by Miss Caroline C. Haynes.)

1 specimen of *Trematodon ambiguus* from Maine. (By exchange with Dr. George B. Kaiser.)

15 specimens of mosses from Washington. (By exchange with Mr. A. S. Foster.)

223 specimens of fungi from California. (Given by Professor R. A. Harper.)

26 specimens of fungi from Wyoming. (By exchange with Professor Aven Nelson.)

400 specimens of gill-fungi from California. (By exchange with Stanford University.)

50 specimens of fungi from Washington. (By exchange with S. M. Zeller.)

19 specimens of fungi from Porto Rico. (By exchange with John R. Johnson.)

PLANTS AND SEEDS.

2 species of *Euonymus*. (By exchange with Bureau of Plant Industry.)

7 orange trees from Florida. (Given by Col. F. A. Schilling.)

4 plants for conservatories. (Given by Mrs. Rautenberg.)

34 orchids, from Canal Zone. (Given by Mr. L. Blenkinsop.)

5 plants of *Opuntia* from Mississippi. (Given by Mr. S. M. Tracy.)

4 plants of *Lachenalia Nelsoni*. (Given by Mr. Wm. Tricker.)

2 plants derived from seed.

160 packets seeds. (By exchange with Royal Botanic Garden, Glasnevin, Dublin, Ireland.)

1 packet seed of *Thrinax punctulata*, from Cuba. (Collected by Mr. Percy Wilson.)

1 packet seed of *Pinus Jeffreyi*. (Given by Mr. W. W. Eggleston.)

19 packets seeds. (By exchange with University of Michigan.)

9 packets of water lily seed. (By exchange with Buffalo Botanic Garden.)

1 packet seed of *Portlandia grandiflora*. (By exchange with Public Gardens, Jamaica, W. I.)

3 packets Cuban seed. (Collected by Mr. Percy Wilson.)

1 packet seed of *Apodanthera undulata*. (Given by Mr. Elmer Stearns.)

LIBRARY ACCESSIONS FROM NOVEMBER 1, 1911, TO JANUARY 31, 1912.

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EDITOR

FRED J. SEAVER

Curator

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JOURNAL

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VOL. XIII April, 1912. No. 148

SOME FEATURES OF THE DISMAL SWAMP OF VIRGINIA.*

The Dismal Swamp, usually called the Dismal Swamp of Virginia, lies partly in Virginia and partly in North Carolina; but it is more accessible from the former, and as most of those who have explored or visited it have entered from the Virginia side, the name of that state is commonly linked with it. Its topographic, geologic, biologic and economic features may be found described in numerous governmental reports; many historical events are connected with it; it figured more or less prominently in certain events of the Civil War, and it has been made the subject of numerous articles, stories and traditions published in works of fiction and in magazine and newspaper literature.

The area of the swamp is about 1,500 square miles. The surface is almost level, sloping gradually from the southwest toward the northeast, with an elevation above mean tide level of from 23–12 feet, and in consequence, the drainage is so imperfect that, throughout most of its extent, it remains constantly inundated. Certain portions, however, become more or less dry in periods of drought, and quite a large portion of its former area—some 700 square miles along the eastern border—has been permanently reclaimed in recent years, by means of drainage, ditches and canals.

Near the center lies Lake Drummond, an almost circular body

* From a lecture delivered at the New York Botanical Garden, September 23, 1911.

of fresh water, about 2¾–3 miles in diameter, with an almost uniform depth of about 6 feet. The surface is now about 22 feet above mean tide level; but previous to the completion of recent drainage operations it was somewhat higher.

The lake may be reached by means of any of the several artificial channels which have been cut through the swamp. Washington and Jericho ditches are only navigable at high water, by small boats or canoes, which have to be poled carefully and more or less laboriously, by reason of the vegetation which has grown into the sides, and the trees which have fallen across in many places, during recent years. In periods of drought these ditches often become dry and may be used as foot paths or trails.

The Dismal Swamp Canal, however, is a permanent, broad artificial channel, which will probably be made a part of the great interior waterway which is planned to extend from New Jersey to Florida. It is navigable for steamboats of small size and is sufficiently wide for steamboats and barges to easily pass each other. The "feeder," by means of which it is connected with Lake Drummond, is also a wide channel, navigable at all times for row boats, motor-boats, etc., as far as the upper lock, within about three-fourths of a mile of the lake. This lock controls the water of the lake, and a lower one, at Deep Creek, controls the entrance to the canal at tide-water.

During the past year I was fortunate in being able to visit the swamp under unusually favorable conditions, as one of a party all of whom were guests of the Lake Drummond Canal Company. The company provided transportation from Norfolk, by steamboat, up the canal to the mouth of the feeder; thence by large rowboats, towed by a motor-launch, up the feeder to the lock near Lake Drummond, where a camp site had been prepared on the bank of the feeder, and tents and two days supply of provisions provided. This site was perfectly dry, in a partly cleared area on the border of the forest and was admirably adapted for the purpose. One night was spent there and the following day Lake Drummond was navigated in rowboats, to the mouth of Washington Ditch, where a transfer was made to smaller boats, which were poled up the ditch to Suffolk. From thence the

CAMP SITE ON BANK OF "FEEDER," NEAR LAKE DRUMMOND.

BALD CYPRESS, SHORE OF LAKE DRUMMOND.

trip back to Norfolk was made by rail. The swamp was thus traversed from one side to the other; two days and a night were spent there, and unusual opportunities for observation were enjoyed.

The camp site had been covered with a dense growth of "cane brake" (*Arundinaria macrosperma*), but a large area was cleared for our accommodation. This grass is an exceedingly characteristic feature of the swamp, forming dense thickets and growing to a height of six or eight feet. The adjacent forest consisted largely of red maple, persimmon, sour-gum, willow-oak, ash, and magnolia, with scattered trees of yellow pine, white cedar and bald cypress. One of the most abundant and striking features was the "jassemin" (*Gelsemium sempervirens*), whose clusters of fragrant, yellow flowers were to be seen everywhere, entwined in the undergrowth.

At night the scene in the vicinity of the camp was rendered wierdly beautiful by the glow of "fox-fire" on the stumps of the trees and in the débris of the forest floor. I had often seen this phenomenon in other localities, but never before to the same extent or brilliancy. The phenomenon is caused by certain fungi, especially in the genera *Panus*, *Clitocybe*, and *Armillaria*, and also by many bacteria; but its nature is not thoroughly understood. It is commonly spoken of as "phosphorescence"; but this is a misnomer as it is not due to phosphorus but to the process of oxidation. A better term to use would be "luminescence."

Undoubtedly, however, the bald cypress (*Taxodium distichum*) is the most striking feature of the swamp. These trees never fail to excite the wonder and admiration of every observer, especially when seen for the first time. The massive, buttressed base; the peculiar processes known as "knees," which rise from the roots; the tall straight trunks, and the delicate, feathery foliage, mark these trees as unique in our modern flora. In many respects they resemble the redwoods and giant sequoias of the Pacific coast, and, like them, they represent the type of a genus which reached its maximum of development in past geologic ages and is now on the highroad to extinction. The bald

cypress will grow in high, dry ground; but its natural habitat is in swamps. It thrives and flourishes under conditions which would be fatal to most other trees, with the roots permanently immersed and often with the base of the trunk entirely surrounded by water. Splendid examples are to be seen on the shores of Lake Drummond, where they constitute almost the sole feature of the outer zone of the lake border vegetation. Many individual trees, isolated from their fellows, grow well out in the lake, constituting one of its most striking features.

The water of the swamp is dark-colored, but clear, resembling strong tea, and has an acid reaction and remarkable antiseptic properties. It is palatable and wholesome and keeps wonderfully well, without becoming foul. In former years it was much used on ships, especially on those about to make long voyages. That from the white cedar areas, known as "juniper-water," was considered the best. Even where the ground is saturated, and the water stagnant, there is an entire absence of the odors which are generally noticeable in salt marshes and in many fresh water swamps where there is abundant decaying vegetation.

ARTHUR HOLLICK.

THE SUCCULENT PLANT COLLECTIONS.

The succulent plant collections are now located in houses 5, 6, 7, and 8, of range 1. They were formerly crowded into houses 5 and 6, but on the completion last summer of the new houses at range 2, the contents of 7 and 8 were transferred there, making more room available for the succulent collections. This increased space has made possible a much better display of these interesting collections of desert plants.

On the west side-bench of house no. 5 are the carrion-flowers, *Stapelia*, belonging to the milkweed family, and the South African liliaceous genera, *Haworthia*, *Apicra*, and *Gasteria*. Following these are members of the purslane family and the fig-marigolds, *Mesembryanthemum*, with the thistle family, represented by such genera as *Senecio* and *Kleinia*, at the extreme end of the bench. The easterly side-bench holds a part of the large collection of the orpine family, the remainder of it being on the

central bench across the walk. The central bench also accommodates the large collection of the liliaceous genus *Aloe*, mainly African in distribution, the fleshy spurges, the bromeliads, and a single genus of the cactus family, *Hylocereus*, one of the climbing groups of that large family, to which belong some of the plants commonly known as "night-blooming cereus."

In house no. 6 are assembled the collection of century plants, *Agave*, and other amaryllidaceous species, and such other plants, too large for incorporation in their proper places in the other houses. The dracaena family is also well represented here by *Yucca* and *Beaucarnea*. Here will be found the large cactus, *Carnegiea gigantea*, and other columnar cactuses, also a number of large specimens of the hedgehog cactus, *Echinocactus*.

In houses 7 and 8 are the true cactuses. It is interesting to note that all the members of this family, with a very few exceptions in Africa, are truly American plants. In house no. 7 are the Cerioideae, including, on the central bench, such genera as *Pachycereus*, *Lemaireocereus*, *Cephalocereus*, and other columnar forms; the climbing and slender columnar forms, represented by such genera as *Selenicereus* and *Nyctocereus;* the leaf-cactuses, *Epiphyllum*, with also a group on a side end-bench; and specimens of the hedgehog cactus, *Echinocactus*, the Turk's-head cactus, *Cactus*, and such genera as *Echinopsis*, *Anhalonium*, *Echinocereus*, and the odd *Leuchtenbergia*.

On the north bench are others of columnar habit, mainly of the genus *Cereus*, while on the south bench are the odd mamillate cactuses, known for many years as *Mamillaria*. Hanging over the walks is a large collection of *Rhipsalis* and *Hariota*. One of these with round stem and branches and white berries is known as the mistletoe cactus.

In house no. 8 are the Opuntioideae and the Pereskioideae. The greater part of the plants here belong to the first tribe, and represent such genera as *Opuntia*, *Nopalea*, and *Pereskiopsis*, the latter with large well-developed leaves. There are many representatives on the south bench of the round-stemmed opuntias, known as cylindro-opuntias, and on the other benches, still more of the flat-stemmed forms known as platyopuntias.

In the Pereskioideae is the genus *Pereskia*, the best known of which is commonly called Barbados gooseberry. To botanists it is known as *Pereskia Pereskia*. *Pereskia Bleo*, and *P. cubensis*, from Cuba, are other species.

GEORGE V. NASH.

CONFERENCE NOTES.

The March conference of the scientific staff and registered students of the New York Botanical Garden was held in the laboratory of the museum building, Monday, March 4, at 4:00 P.M. Dr. C. B. Robinson gave an interesting account of Philippine Botanical Explorations of which the following is a summary:

Camel, the earliest of all botanical explorers in the Philippines, appears to have visited a greater number of the islands than any of his successors, and that about the end of the seventeenth century. Many subsequent expeditions stopped there, but confined their investigations to few localities. Cuming, however, covered much ground, and his work has been of especial value through the large series of duplicates obtained, now distributed in nearly all the large herbaria of the world.

In general, the Spanish botanists explored a very limited area, the country around Manila, and for about 20 miles to the north and northeast. At the end of their regime, under Sebastian Vidal, specimens were obtained from many additional parts of the Islands.

Since 1902, nearly all the larger islands have been explored to a greater or less extent, especially by certain members of the staff of the Forestry Bureau, notably H. M. Curran, H. N Whitford, M. L. Merritt, W. I. Hutchinson, R. Meyer, T. E. Borden, P. T. Barnes, and R. Rosenbluth; by the botanists of the Bureau of Science, E. D. Merrill, F. W. Foxworthy, and C. B. Robinson, two of their assistants, Maximo Ramos and E. Fénix, and the ornithologist, R. C. McGregor; by the Bureau of Government Laboratories, predecessor of the Bureau of Science, which adds the names of E. B. Copeland and A. D. E. Elmer. The last of these has made extensive explorations in recent years as a

private collector. A. Loher, formerly of Manila, worked over many localities. The only large collection made in recent years for any outside institution was that obtained by R. S. Williams for the New York Botanical Garden. Two other private collectors, who have done important work, are Father M. Vanoverbergh in northern Luzon, and Mrs. Mary Strong Clemens in the Lanao district of Mindanao.

Nearly all of these have visited Mount Mariveles at the entrance to Manila Bay, the Benguet hill region, and Los Baños at the base of Mount Maquiling, on Laguna de Bay. Other mountains from which much has been obtained are Pulog, Data, Tapulao and the Banajao range, in Luzon; Halcon in Mindoro; Apo, Malindang, and the hills near Zamboanga in Mindanao; Canlaon and the Cuernos peaks in Negros; and Giting-giting on Sibuyan; while districts of varying elevation more or less carefully explored are the Batanes and Babuyanes Islands at the extreme north of the Archipelago; Polillo east of Luzon; the northeastern part of Rizal Province, and Sorsogon, in Luzon; parts of Palawan, Mindoro, and Leyte. Less extended investigations have been made in very many places.

Districts where little or nothing has been done, and from which much may reasonably be expected, are the northeast of Luzon, the Polis range in northern Luzon, Mount Isarog in southern Luzon, Samar, the northeastern and eastern coast of Mindanao, Matutum in Mindanao, several parts of Palawan, and the chain of islands connecting Jolo with Borneo.

In general, the work of exploration presents no great difficulty. The climate is good, insect pests are negligible except the ants, there is nothing to be feared from larger animals, and transportation is becoming easier.

A. B. STOUT.

SPRING LECTURES, 1912.

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

April 27. "Date Gardens of the Sahara Desert," Mr. T. H. Kearney.

May 4. "The Preservation of Our Native Plants," Dr. N. L. Britton.

May 11. "The Deserts and Mountains of Southern Arizona," Prof. H. M. Richards.

May 18. "Botanizing in the Region of the Natural Bridges, Utah," Dr. P. A. Rydberg.

May 25. "Some of the Plants that Live in the Sea," Dr. M. A. Howe.

June 1. "Condiments and Spices and Their Sources," Dr. H. H. Rusby.

June 8. "Orchids," Mr. G. V. Nash.

June 15. "Four Weeks in Western Cuba," Dr. C. S. Gager.

June 22. "Poisonous Plants of Our Woodlands," Mr. Norman Taylor.

June 29. "Exploring the Pacific Coast—I. New York to Seattle," Dr. W. A. Murrill.

The lectures, which occupy an hour, will be illustrated by lantern-slides and otherwise. The doors will be closed at 4:00, and opened again at 4:15 to admit those arriving late.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

NOTES, NEWS AND COMMENT.

Dr. L. H. Pennington of Syracuse University spent several days at the Garden during the early part of April working on the genus *Marasmius* for North American Flora.

Professor J. T. Burrill, vice-president of the State University of Illinois and one of the pioneer botanists of this country, was a

visitor at the Garden on March 22. Professor Burrill has been attending the centenary meeting of the Academy of Natural Sciences of Philadelphia.

Volume 7, part 3, of North American Flora was issued in April, 1912. This part consists of a continuation of the Aecidiaceae, a family of plant rusts which was begun in part 2, of the same volume. The genus *Gymnosporangium* or cedar-apple rusts was treated by Dr. F. D. Kern and the remainder of the part by Professor J. C. Arthur, of Purdue University Agricultural Experiment Station. The entire part consists of 106 pages of text.

Dr. Wilder D. Bancroft, professor of physical chemistry at Cornell University, delivered a lecture on March 15, at the chemists club under the auspices of the Columbia University Biochemical Association. The subject of the lecture was "The Study of Environment" and was treated from the standpoint of the physical chemist. The lecture was attended by a number of local botanists who participated in the discussions which followed.

Dr. George T. Moore has been elected to succeed Dr. William Trelease as director of the Missouri Botanical Garden and will enter upon the duties of the new position May 1, 1912. Dr. Moore is a graduate of Harvard University and was assistant in the cryptogamic laboratory of that institution for two years. He also served for a time as instructor in cryptogamic botany in Radcliffe College and later was in charge of botany at Dartmouth. He was employed by the United States Department of Agriculture for several years, first as physiologist and algologist and was later put in charge of the laboratory of plant physiology. In 1909 he was appointed professor of plant physiology and applied botany in the Shaw School of Botany and at the same time served as plant physiologist to the Missouri Botanical Garden. Dr. Moore is the author of a number of research papers, several of them dealing with the contamination of water supplies by algae and other phases of economic botany.

At the recent centenary of the Academy of Natural Sciences of Philadelphia, Dr. C. Stuart Gager, director of the Brooklyn

Botanic Garden, was in attendance as a delegate from the Brooklyn Institute of Arts and Sciences, the University of Missouri, and the Torrey Botanical Club.

Miss Alice Eastwood, curator of the botanical department of the California Academy of Sciences, spent two weeks in consulting the herbarium and library of the Garden in the latter part of March. A very interesting account of Miss Eastwood's experiences in saving most of the Academy's herbarium "types" at the time of the San Francisco earthquake and fire was published in *Torreya* for June, 1906. Permission has been obtained for the erection of a new building for the Academy in Golden Gate Park, San Francisco.

At the exercises in commemoration of the one hundredth anniversary of the foundation of the Academy of Natural Sciences of Philadelphia, March 19–21, the Garden was represented by Dr. Marshall A. Howe, who presented an illustrated paper on "Reef-building and Land-forming Seaweeds." In this paper the important and often predominating part played by the lime-secreting seaweeds in building "coral reefs" was emphasized. Delegates were in attendance representing most of the universities, colleges, and learned societies of North America and many of those of Europe.

A snow storm followed later by rains, amounting to considerably less than 2 inches of water altogether in this vicinity, occurred on March 12, helping to bring about, the next day, a flood in the Bronx River scarcely or not exceeded by any within the memory of the older residents. The road from the upper bridge in the Botanical Garden to near the foot of the grade at the Scott Avenue bridge was under water all day on the 13th, in some places to a depth of 2 feet or more when the flood was at the highest at about 3.30 P.M. An hour and a half later the water had fallen 6 or 7 inches and it continued to fall all through the night, so that on the morning of the following day it was some 4 feet below the high water mark of the preceding afternoon, and the road above mentioned was everywhere out of water, although quite a stream was still flowing over the road leading eastward from the small wooden bridge at the lower side of the meadows.

this is the only genus of the cactus family which has representatives outside of America, a few species occurring in Africa and one with a distribution extending to Ceylon. The plants are, for the most part, epiphytic, that is, they grow upon other plants without deriving nourishment from them. Of the known species, about 55, only 5 occur in the Old World. Of the remainder over 85 per cent. are in South America, chiefly Brazil, only 3 growing in the West Indies and the same number in Central America.

They present a wide diversity in form. In some the stems are round, as in the mistletoe cactus, *Rhipsalis Cassutha*, a native generally of tropical America. In others the stems are furnished with three to six or more ribs, as in *R. pentaptera* and *R. sulcata*. While *R. rhombea*, *R. alata*, *R. Regnellii*, and other related species, represent those in which the stem is wide and flat, the joints leaf-like. These latter also frequently have roots arising from the midrib of the joint, indicating their preferred habitat on trees, to which they attach themselves by this means.—*G. V. N.*

ACCESSIONS.

MUSEUMS AND HERBARIUM.

1 cotype specimen of *Phyllachora Merrilli* Ricker. (Collected by Mr. E. D. Merrill.)

2 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)

1 specimen of fungus from Washington. (By exchange with Mr. E. Bartholomew.)

4 local fungi from propagating house. (Collected by Mr. Fred J. Seaver.)

40 specimens of fleshy fungi from Cold Spring Harbor, L. I. (Given by Dr. E. D. Clark.)

10 specimens of fungi from Island Heights, N. J. (Collected by Percy Wilson.)

100 specimens of fleshy fungi from Rochdale, Massachusetts. (Given by Dr. E. D. Clark.)

14 specimens of woody fungi from Ohio and Florida. (By exchange with Mr. L. O. Overholts.)

78 herbarium specimens from British Columbia. (By exchange with the Geological Survey of Canada.)

5 specimens of *Rosa* from North Dakota. (By exchange with Dr. J. Lunell.)

2 specimens of *Primula* from northeastern Utah. (Given by Miss Edna Scorup.)

1 specimen of *Polypodium* from Costa Rica. (By exchange with Mr. C. Belhatte.)

1 specimen of *Pylaisia polyantha* from Gaspe, Quebec. (By exchange with Dr. George B. Kaiser.)

40 lichens from Washington. (By exchange with Mr. A. S. Foster.)

44 specimens of cacti and other North American succulents. (By exchange with the United States National Museum.)

100 specimens " Kryptogamae Exsiccatae," Century 18. (Given by the Natural History Museum, Vienna, Austria, for the Columbia University herbarium.)

4 specimens of mosses from Arkansas and Texas. (Collected by Mr. B. F. Bush.)

PLANTS AND SEEDS.

26 plants for nurseries. (By exchange with Bureau of Plant Industry.)

2 plants of *Opuntia Pollardi*. (By exchange with U. S. National Museum, through Dr. J. N. Rose.)

45 plants from Cuba. (Collected by Dr. N. L. Britton and Mr. J. F. Cowell.)

5 Cuban plants for conservatories. (Collected by Dr. J. A. Shafer.)

11 plants of *Hedychium*. (By exchange with Royal Botanic Garden, Glasnevin, Dublin, Ireland.)

3 Utah plants for the conservatories. (Given by Miss Edna Scorup, through Dr. P. A. Rydberg.)

3 plants of *Weberocereus australis*. (By exchange with U. S. National Museum, through Dr. J. N. Rose.)

1 packet seeds of *Passiflora pedata*, from Cuba. (Collected by Dr. J. A. Shafer.)

150 packets seed. (By exchange with Botanic Garden at Budapest.)

7 packets seeds, from El Paso, Texas. (Given by Mr. E. P. Stearn.)

1 packet seed of *Lobelia inflata*. (Collected by Mr. George V. Nash.)

93 packets seed. (By exchange with Botanic Garden, Bonn, Germany.)

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EDITOR

FRED J. SEAVER

Curator

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JACK IN THE PULPIT.

JOURNAL

OF

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WILD PLANTS NEEDING PROTECTION.[1]

1. "JACK IN THE PULPIT" (*Arisaema triphyllum* (L.) Torr.)

(WITH PLATE XCIII.)

When the trees are unfolding their fresh green leaves in May and June, and the violets and spring-beauties are in bloom, Jack-in-the-pulpit may be found in moist woodlands and on shady banks, where the earth is soft and loamy. It is a perennial herb, and if left undisturbed, it sometimes lives many years and attains a height of three feet, with a subterranean corm as large as an apple. This corm has given to the plant the name of "Indian turnip" though it is not edible, when raw, for it has an acrid taste, irritating to the tongue, on account of the acicular crystals of calcium oxalate which it contains, known as raphides. It propagates by forming smaller secondary corms around the older ones and in this way new plants are started. It often bears no fruit in the vicinity of New York, not only on account of the depredations of children, but because it is dioecious and the proper insect visitors, on which it is dependent for pollination, seem to be lacking. Usually the leaves turn yellow and the plant disappears in June and July, though this varies in different portions of its range, which extends throughout the Eastern and Central states, as far north as Nova Scotia and Ontario and south to Florida and Louisiana. It bears what would appear to most children to be a single large flower, but is really a cluster of small simple flowers, borne at the base of a fleshy club-shaped spadix, which is enclosed by the convolute base of the spathe, the summit of

[1] Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

which arches over it, and is either pale green or a dark glossy brown, often striped with white.

There are usually two leaves, which are three-parted, graceful in shape and beautifully veined. The leaf-stalks are sheathing at base and enclose that of the flower-cluster. The staminate plants are often smaller and paler than the pistillate and wither as soon as they have discharged their pollen. Their flowers consist of only 2–4 almost sessile, white or purple anthers, borne on the fleshy mucilaginous base of the spadix. The pistils are crowded together, without calyx or corolla, green, globose and tipped with a sessile white stigma; occasionally a few stamens may be found above the pistils. The fruit cluster, when ripe, is usually prostrate, from 1–3 inches long and the berries are bright scarlet.

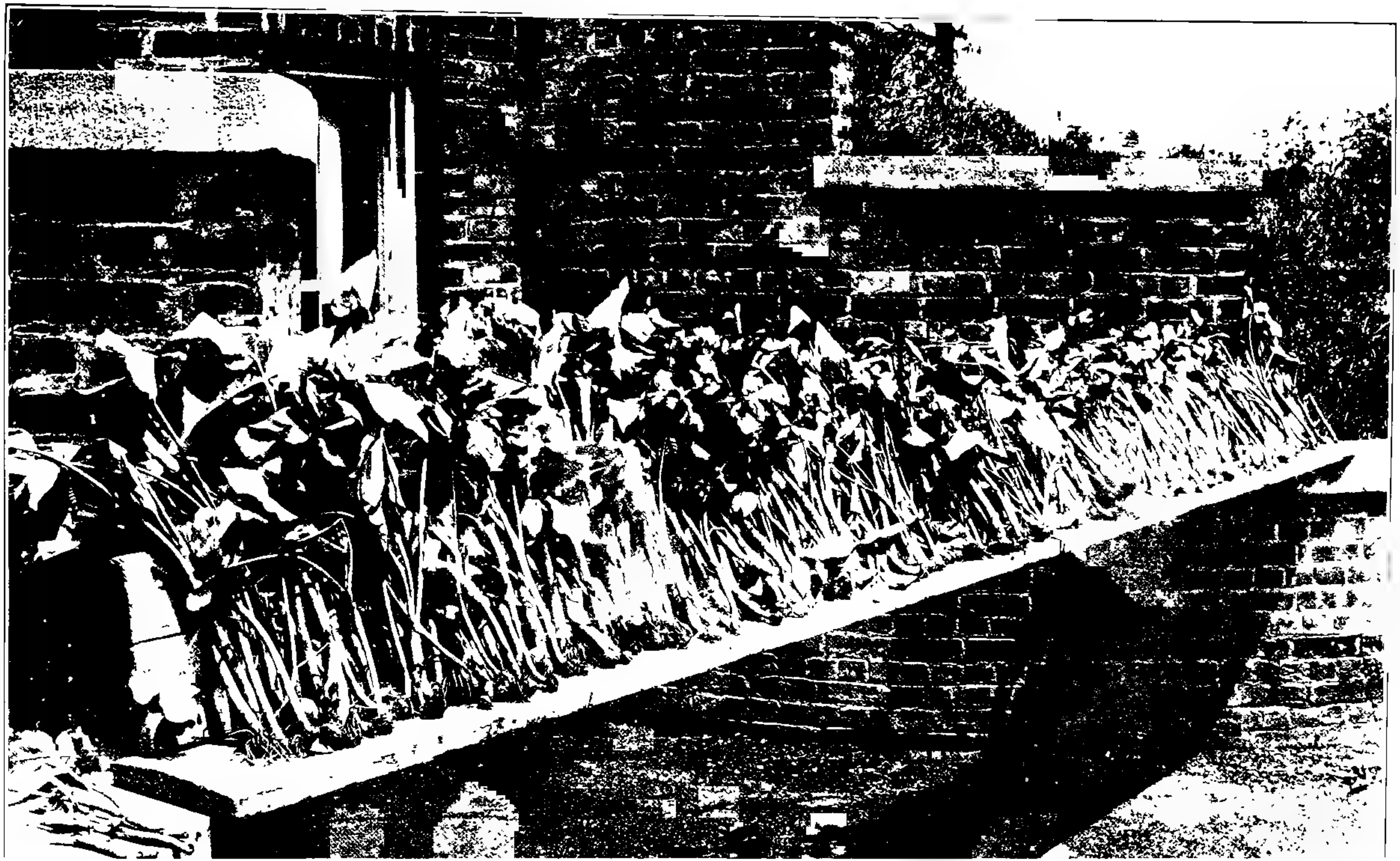
Plukenet appears to have been the first to figure this plant and he described it in his Phytographia in 1691 as "*Arum triphyllum minus atrorubente*" from plants sent to him by Bannister from Virginia. Linnaeus in his Species Plantarum, 1753, quoted this description and called it "*Arum triphyllum.*" It resembles some of the European species of *Arum* and belongs to the Araceae, a family of plants, most of which are tropical in their distribution and which includes about 105 genera and over 900 species, many of them being large and showy plants often climbing on trees and rocks.

ELIZABETH G. BRITTON.

THOUGHTLESS DESTRUCTION OF JACK IN THE PULPIT.

(WITH PLATE XCIV.)

On May 15, 1911, two classes of boys and girls from one of the Public Schools of Manhattan accompanied by their teachers, spent a few hours in the vicinity of the Lorillard Mansion in Bronx Park. They were given permision to pick "wild flowers" by one of the foremen of the Park Department, and when found, at 2 p.m. within the limits of the New York Botanical Garden, all the children had large paste-board boxes and newspapers full



of various kinds of flowers and trees, most of them uprooted. They were confiscated, and of Jack-in-the-pulpit they had taken 410 plants! which are shown in the accompanying photograph. New signs have been posted throughout the limits of the New York Botanical Garden which read: "*The picking of wild flowers is strictly forbidden*" and the old signs read: "*Do not pick or break, plant, leaf or flower.*" It is hoped that these will help to prevent such vandalism!

ELIZABETH G. BRITTON.

FURTHER BOTANICAL EXPLORATION IN CUBA

TO THE SCIENTIFIC DIRECTORS,

Gentlemen: Under previous authorization to continue botanical exploration in the West Indies, I recently proceeded to eastern Cuba, leaving New York on the Royal Mail Steam Packet "Orotava" on March 2, 1912, arriving at Antilla, on Nipe Bay, March 6. I was accompanied by Mrs. Britton and also by Mr. John F. Cowell, director of the Buffalo Botanic Garden. My sister, Miss Harriet Louise Britton, was also in the party. The objects of the expedition were to examine portions of Cuba not hitherto studied by us, and to reëxamine certain areas previously visited, for the purpose of obtaining more complete specimens of some species of exceptional interest previously collected.

Collections were made at Antilla and at Punta Piedra, on the coast of Nipe Bay, on March 6, 7 and 8, in coastal thickets and woodlands. In woodlands less than a mile inland from Antilla, we were much pleased to find many plants of the cycad, *Zamia media*, and we obtained a number of them for cultivation here. *Zamia* is a very interesting genus, containing a considerable number of species, the West Indian ones all having stout stems vertically imbedded in the soil, the crown of pinnate leaves thus appearing to rise directly from the surface of the ground, the flowers borne in short, oblong cones in the middle of the crown of leaves, some plants being staminate, others pistillate. They are poorly represented in most collections of

living plants, but we have now succeeded in bringing together at the Garden most of the West Indian kinds and a few from continental tropical America. The most attractive floral feature observed was in hillside woodlands at Punta Piedra, a half shrubby species of the acanthus family, with rose-purple flowers. Ripe seeds of it were obtained.

On March 9, we proceeded from Antilla to Santiago by rail, and Santiago was made a general base of operations for two weeks. I especially desired to see the native cactuses of this part of the southern coast of Cuba, and succeeded in finding and obtaining specimens for cultivation of all the species known to inhabit the region. They grow on dry, rocky hillsides along and near the sea, accompanied by a great many peculiar shrubs and small trees, a number of which inhabit only this region. The characteristic maguey (*Agave*) is abundant, and at the time of our visit very conspicuous with its tall panicles of bright yellow flowers, which dotted the landscape in showy masses. The immediate vicinity of Santiago and especially the unculti-vated region between the city and the sea to the south, including the hills which bound the beautiful harbor, were quite thoroughly explored and specimens were taken of most of the plants to be found there. As in most West Indian floras, the plants are very locally distributed; in many cases, small colonies consisting of only a few individuals could be found, but the number of species is large. As in other dry-region floras, many of the plants are spiny or prickly, making progress through the woodlands impossible without free use of the machete, and thus practically restricting exploration, except for special objects, to existing trails or wood roads. One of these spiny shrubs (*Anthacanthus*), about three feet high, was profusely covered with fine purple flowers and would be fine for cultivation, but we could obtain no ripe seeds during our visit. In this dry region, ferns and mosses were very rare, but one beautiful little fern inhabits crevices of the coastal rocks east of El Morro.

Through the kind coöperation of Mr. Jennings S. Cox, manager of the Spanish American Iron Company, we were enabled to study the vegetation in the vicinity of Daiquiri, one of the

mining towns of that company, a few miles east of Santiago, where we were received and hospitably entertained by Mr. G. W. Pfeiffer, superintendent. The railroads of these mines enabled us to traverse a considerable stretch of country, both on the coast and at a short distance from it, and a trip on horses into the hills supplied an additional view of the flora. One of our principal objects in visiting this place was to see the cactus of the genus *Leptocereus* collected near Berraco some years ago by Mr. William R. Maxon, of the United States National Museum, and one of the railroads took us directly to it under the guidance of Mr. McGill, of Mr. Pfeiffer's staff. This genus *Leptocereus* has been of great interest on account of recent discoveries of undescribed species in Cuba. Three years ago, when the paper by Dr. Rose and myself on "The Genus Cereus and Its Allies in North America" was published by the Smithsonian Institution, only one species was definitely known, *Leptocereus assurgens*, which inhabits rocky coastal hills both east and west of Havana, originally described by Professor Grisebach in 1866. Two additional species have since been described,* *Leptocereus arboreus*, which inhabits rocky soil on the west side of Cienfuegos Bay, and *Leptocereus Leoni*, discovered by Brother Léon, of the Colegio de la Salle, Vedado, Havana, on limestone cliffs in the Sierra de Anafe near Guayabal. Our examination of the plant at Berraco proves definitely that it represents a fourth still undescribed species, of which we secured cuttings for cultivation, and, by great good fortune, two fully opened flowers; these are white, and of relatively small size, the very numerous petals spread out flat, appearing at first glance like the flower heads of some single chrysanthemum, and wholly different from any cactus flower hitherto known to us.

The arborescent cactuses of the region were studied under favorable conditions on the coast just east of the Daiquiri landing, where they are abundant, and cuttings of them were taken for cultivation. Here also we studied with great interest a fine, flowering tree of the Cuban *Catalpa;* it has narrow leaves and much smaller flowers than any of the northern trees of that

* Torreya 12: 15.

genus, is low with widely spreading branches, and in many respects so different from the true catalpas that it could properly be regarded as a distinct genus. *Calcyophyllum*, a tall tree related to *Cinchona*, is rather abundant in this region and is of special interest from the structure of its flowers, one of the calyx-lobes being expanded into a large white structure, the other four being small and inconspicuous.

Through the further aid of Mr. Jennings S. Cox, we were enabled to study the vegetation in the vicinity of the mines at El Cuero near Nima-Nima, west of Santiago. A schooner was chartered for this expedition and we were cordially received and hospitably entertained at El Cuero by Mr. S. A. Barratt, superintendent. Here we studied the flora of the coastal hills and on horses ascended into the mountains, reaching an altitude of over 1,500 feet, where we found an extensive area of pine-lands with an associated flora of great interest and variety. A fine small-flowered *Begonia* and a striking scarlet-flowered *Gesneria* inhabit rocky stream banks. A shrub of the heath family related to our privet-andromeda, profusely covered with clusters of white, fragrant, urn-shaped flowers, was an object of great interest and beauty on the hillsides. Several rare ferns grow in the wet ravines; the boundaries of the pine-lands are sharply delimited, the pines occupying certain hills to the exclusion of other trees. We found that this region would make a favorable camping base for expeditions to much higher altitudes of the Sierra Maestra which are as yet little known botanically, and I hope that such exploration may be accomplished in the future.

Both going to El Cuero and returning, we stopped at Cabañas Bay, a beautiful landlocked harbor, and made collections along its shores and along the adjacent seacoast. Here we were enabled to study to great advantage one of the most peculiar of the Cuban cactuses, the tall prickly-pear (*Opuntia macracantha*), a fine colony of which exists on a rocky bench about a mile east of the harbor entrance. This plant has an erect trunk up to 15 feet high, crowned at the top with numerous nearly horizontal, jointed, flat branches bearing small yellowish flowers.

The armament of this plant is remarkable; all the young joints observed were densely spiny, while the older joints become entirely spineless, and this spineless condition is continued down the trunk about half way to the ground, its lower half being covered with most vicious spines up to 6 inches long; it would appear that we have here a plant which has use for a spiny armament on its young parts and on its oldest, but not on those parts of medium age. The straight upright stem and widely spreading branches reminded us of semaphores, and we gave the plant the name of semaphore cactus.

Mr. Cox also arranged for us a visit to the copper-mining town, El Cobre, and a day was spent in that vicinity studying the flora of rocky and gravelly hills, where many small plants of interest to us occur and where we saw the largest grove ever observed by us of the cashew-nut or "marañon" (*Anacardium occidentale*), portions of the fruit of which are roasted and eaten like peanuts or almonds.

Proceeding westward by steamer during the night of March 26, our next base was at Ensenada de Mora, the port of the Cape Cruz Sugar Company, located about thirty miles east of Cape Cruz, where an extensive area of arable land lies between the sea and the western end of the Sierra Maestra and where we were received with great cordiality and hospitality by Mr. George M. Boote, administrator, and Mr. George R. Buchanan, assistant administrator, of the sugar company. We remained here four days and studied the flora of the coastal woodlands and thickets and that of hillsides and mountain "arroyos" up to altitudes of about 1,100 feet, horses and guides being supplied through the kindness of Mr. Boote. There is an abundant flow of pure water in certain of the mountain valleys and in them we found a luxuriant and varied vegetation, including many ferns and orchids and flowering trees and shrubs in great variety. In places the valleys are formed by steep cliffs and on these several plants of special interest were collected, the most showy and one of the rarest being the linear-leaved *Plumiera*, a small tree of the dog-bane family, profusely covered with large white flowers. This genus has its greatest development in the West Indies, many

species being known from the different islands, and several of them are prized for cultivation in tropical gardens, though they do not flower freely nor grow very vigorously in northern greenhouses; a supply of young plants was taken, however, for experimental purposes. On these cliffs, the Cuban melon-cactus abounds; we were somewhat surprised at finding this on cliffs three or four miles from the coast, because our previous knowledge of it had been confined to its occurrence on coastal rocks further east. Previous attempts to introduce this *Cactus Harlowii* into cultivation with plants taken from the naval station at Guantanamo Bay had met with failure, so a large number were dug out from among the rocks at this point and very carefully packed in sacks to avoid any bruising and thus transported to the Garden. Coastal woodlands west of the port proved very interesting collecting grounds, to which we were guided by Mr. H. J. Nix, electrician of the sugar company. Here large cactuses abound, growing intermixed with hardwood trees. One of them belongs to the genus *Leptocereus*, and is related to the one described above from near Daiquiri; ripe fruits of it were obtained, but the plant was not in bloom at the time and its flowers are still a desideratum. One of the most interesting trees of this woodland is *Phlebotaenia*, of the milkwort family, with showy purple flowers something like those of our northern herbaceous gay-wings, and another flowering tree related to our fringe tree, with similar narrow white petals, is abundant. In another wooded thicket just east of the port, we were pleased to find the leafy cactus, *Pereskia cubensis*, hitherto known to us only from the vicinity of Guantanamo Bay; this small spiny tree would not be taken for a cactus without a knowledge of its flowers, for it belongs to one of the genera which bear leaves much like those of many other flowering plants, and in this respect very different from the great bulk of the cactuses, which are leafless; cuttings of this were also taken, their spiny armament rendering the process difficult. I am glad to be able to report that the two cuttings which I brought from Guantanamo Bay three years ago are growing vigorously; they are among the most interesting of all cactus plants in the Garden collections.

Our next stop was at Manzanillo, but little time was spent

there, because the region is highly cultivated and available collecting grounds not very readily reached, and also because Dr. Shafer had previously done work in the vicinity. On April 1, we proceeded to Camaguey by rail and devoted a week to the study of the extensive savanna tracts to the north and east of that city. We had spent one day here three years ago and at that time observed so many plants of interest that we desired to make the study more complete. These savannas are very extensive, many square miles of country being devoid of forests and the sterile soil uncultivated, except at widely separated points where small areas of arable land occur. Most of the area is relatively level, but there are some hills and the region is traversed by a number of small streams and brooks, "arroyos" of the Cubans. Palms of several species abound and two of these, species of *Copernicia*, are of special interest because we found at a number of points where the two grow in proximity, many trees quite intermediate in features between the two species and apparently of hybrid origin. Inasmuch as hybrid palms in the wild state are unrecorded, so far as my examination of literature has gone, and in any event they must be very rare, this observation is one of the most interesting and important made during the trip. Except for the palms, the dominant tree of the savannas is a species of *Pisonia*, of the four-o'clock family, with dioecious small green flowers. A rare and beautiful orchid (*Laeliopsis*) was abundant on many of these trees, the roughish bark evidently being wholly acceptable to the orchid which clung to the trees in large masses, even covering portions of the trunk and branches, its clusters of large purple flowers forming a wonderfully fine floral effect. A wild vanilla vine, another orchid, climbs to the tops of the palm trees; it was not in bloom, unfortunately, but we obtained specimens of its pods. A very interesting sensitive plant, yellow-flowered and with prostrate stems, was attractive, and a supply of its seeds were obtained for cultivation; it is much hoped that these will grow, because an additional sensitive plant would be valuable for experimental purposes, and the species here found is not in cultivation. Two species of shrubs with showy pink flowers (*Tabebuia*), related to our trumpet vine, were abundant and conspicuous; this genus

has a large number of species in Cuba, some of them forming large trees, called "roble" by the Cubans, the wood having somewhat the properties of oak. Our collections now include several undescribed species of this genus, which is represented nearly throughout the West Indies and in South America. Both on the hillsides and in the arroyos, shrubs and low plants abound in great variety. Two shrubs of the pea family, both new to science and one of them apparently representing an undescribed genus, were among the prizes found here, and all together, specimens of some 200 different kinds of plants were collected during one week's stay at Camaguey.

Proceeding on April 8 to Santa Clara, two days were given to a restudy of the extensive palm-barrens and savannas in the vicinity of that city, and a number of plants previously collected here in incomplete condition were found in flower or in fruit, enabling us to classify some of them satisfactorily. We reached Havana on the morning of April 11 and in the afternoon of that day we visited El Parque Tropical, a park developed within the last few years under private auspices and containing many interesting plants, where we were cordially received by Don Ramón Magriña, in company with Dr. Felipe Garcia Cañizares, director of the Havana School Botanical Garden, and Brother Léon, of the Colegio de la Salle, both valued correspondents and coöperators in our Cuban studies.

April 12 was given to a visit to the wet coastal savannas at Batabano, on the south coast, in company with Professor Carlos de la Torre, of the Havana University.. Here we found a flora with much in common with that of the Florida Everglades, including the Palmetto (*Sabal Palmetto*), the occurrence of which in Cuba had hitherto been uncertain. We sailed from Havana April 13 on S. S. "Saratoga," reaching New York on April 16.

All together, 932 different plants were collected during the expedition, including over 2,500 specimens, and the Garden's collections of living plants and museum and herbarium specimens have thus been greatly enriched.

Respectfully submitted,

N. L. BRITTON,

Director-in-Chief.

WILLIAM BAYARD CUTTING.

The death of Mr. Cutting on the night of the first of March removed from the board of managers a member who had served continuously since 1896 and was an original member of the Garden corporation.

Mr. Cutting was born in New York City on January 12, 1850, and was graduated from Columbia College in 1869. Two years later, after obtaining the degrees M.A. and LL.B. from his alma mater he was admitted to the New York Bar and for years practiced law with his brother, R. Fulton Cutting. A lawyer by profession, Mr. Cutting devoted a large amount of time to philanthropic and educational work and was identified with a number of public enterprises. Among the organizations of which he was a director are the New York Botanical Garden, the American Museum of Natural History, and the Metropolitan Museum of Art. He was also for many years a trustee of Columbia University and was prominent in numerous commercial enterprises.

During the early years of the movement to establish the New York Botanical Garden, Mr. Cutting was active in his interests in the institution, especially in the landscape and architectural problems involved. He was much interested in hardy trees and shrubs and assembled a fine collection on his estate at Oakland, Long Island. His health in recent years prevented him from much active participation in the work of the Board of Managers but he has made occasional visits to the grounds and has attended meetings at intervals.

WHEREAS, William Bayard Cutting, an original incorporator of the New York Botanical Garden, and a member of its Board of Managers since 1896, departed this life on March 1, 1912.

Resolved: That the Board of Managers, deeply deploring their loss, desires to record his long service to the Garden as a Manager and their grief at his untimely death.

Resolved: That a copy of this memorial and resolutions be sent to his bereaved family, to whom the sympathies of this Board are extended.

The foregoing memorial and resolutions were approved by the Board of Managers at a meeting held May 23, 1912.

N. L. BRITTON, *Secretary*.

THE BANANA HOUSE.

No collection of plants in conservatory range I more impresses the visitor with the wonderful vigor of growth of tropical vegetation than the collection of banana and other plants assembled in house no. II. The stately stems and the large broad leaves, perfect in shape, are very impressive.

All the large plants here, those of commanding stature and striking in their appearance, belong to the banana family, Musaceae. The wonderful leaves of the traveler's tree, *Ravenala madagascariensis*, at once arrest the attention. These are arranged in a fan-like manner, the broad flat blades borne on stout stalks several feet long. In its native land, Madagascar, it serves several economic purposes. Related to this, and resembling it somewhat in appearance, is the tall bird-of-paradise-flower, *Strelitzia Nicolai*, with its fantastic flowers of blue and white, borne up among the large leaves. Among the smaller members of this genus, never attaining the dignity of a trunk, is that known as the queen's bird-of-paradise flower, *S. reginae*. This is more common in cultivation and has gorgeous flowers of blue and gold.

The most interesting plant in this family is the common banana, *Musa sapientum*, which is widely cultivated in all tropical and warm temperate regions the world over, where it and its related species, the plantain, *M. paradisiaca*, furnish a great part of the food to millions of people. All members of the genus *Musa* are natives of the tropical Old World. Another banana, known as the Chinese dwarf, is *M. Cavendishii*, of southern China. A plant of this is now forming a bunch of fruit. The edible bananas all bear their fruit in pendulous clusters, and reproduce themselves by means of "shoots" or "suckers" arising from the root, having lost the power of producing seed. Another member of this genus of economic importance is *M. textilis*, of the East

Indies, from which is obtained the fiber known as Manila hemp. *M. zebrina*, with purple-marked young leaves, and the tropical Asian *M. rosacea*, with rose-colored bracts, are both in the collection. *M. coccinea*, from China, conspicuous on account of the bright red bracts of the erect flower cluster, is now in flower. *M. Ensete*, the Abyssinian banana, reproduces itself by seeds, making no "suckers."

Bihai, or sometimes known as *Heliconia*, is another genus of the banana family. It is an American type, if we exclude those forms from the tropical Old World which differ so widely in habit and general appearance, and which probably do not belong to this genus. An example of this is *Bihai geniculata*, described a few years ago from plants in the Garden of horticultural origin. *Bihai aureo-striata*, from the Solomon Islands, and *B. illustris rubricaulis*, a native of the Pacific Islands, both have richly colored foliage and are highly decorative.

Other plants forming part of this collection belong to the ginger family, Zingiberaceae. Prominent among these, not for its size, for it is much smaller than many of the others, but for its economic importance, is the ginger plant, *Zingiber Zingiber*, of which there are several plants. It is the dried rootstocks of this plant which form the commercial ginger. Anther plant now in flower, with a similar fragrance to the crushed leaves, is the Chinese ginger, *Alpinia officinarum*, a native of southern China. Of the same genus is the shell flower, *A. nutans*, of the East Indies, now bearing its nodding flower clusters which are of striking beauty, the outer parts of the flower being white, delightfully flushed and tipped with rose, while the lip is charmingly marked with yellow and red. In marked contrast to this is *A. vittata*, of the South Sea Islands, with its variegated foliage of white and green. *Hedychium coronarium*, the East Indian garland flower, with deliciously fragrant white flowers, and *H. Gardnerianum*, with yellow flowers, add another genus of the ginger family. The genus *Costus* also belongs to this family, and is native in both the Old World and the New. Many of these, on account of the marked spiral arrangement of the leaves, are known as spiral-flags. The Brazilian species, *C. igneus*, has flame-

colored flowers. Another decorative species is *C. Malortieanus*, from Costa Rica, with attractive leaves striped with a darker green, and yellow flowers beautifully streaked with red.

One corner in this house is devoted to a collection of pineapple plants. Many forms of this valuable plant are here brought together, some of them being highly decorative on account of their beautifully variegated foliage.

GEORGE V. NASH.

CONFERENCE NOTES.

The April conference of the scientific staff and registered students of the New York Botanical Garden was held in the laboratory of the Museum Building, Thursday, April 4, at 4:00 P.M. The programme consisted of a symposium on the North American Hepaticae as follows:

Professor A. W. Evans: "Recent Advances in our Knowledge of the North American Hepaticae."

Miss Caroline C. Haynes: "Notes on the Ricciaceae."

Dr. M. A. Howe: "The Mitten and the Underwood Collections of Hepaticae."

Professor R. A. Harper: "Some Recent Advances in the Cytology of the Hepaticae."

Professor Evans introduced the subject as follows: During the past few decades our knowledge of the North American Hepaticae and of their distribution has been very materially increased. In 1884 Professor Underwood published his "Descriptive Catalogue of the North American Hepaticae, North of Mexico." This catalogue, although largely a compilation, represented the first attempt to give a complete account of our hepatic flora and formed the basis for subsequent work. The total number of species recognized was 231, of which about 80 were more or less definitely assigned to New England. The latest estimate of our species is given by Miss Haynes in her recent "Sullivant Moss Society Exchange List of Hepaticae found in United States and Canada." In this list 353 species are recognized. Miss Haynes,

however, omits the species from Greenland and other parts of Arctic America, which have not yet been detected farther to the southward. These species, which are known to us through the researches of C. Jensen, Bryhn, and others, number about 24. If these and a couple of other species described since January 1 are added, the total number known from North America north of Mexico is 382, an increase of 150 since Underwood published his catalogue. The latest estimate of the number occurring in New England is 169, more than twice the number given by Underwood.

This increase in number is partly due to new explorations and partly to a more critical study of certain difficult genera. The exploration has been productive not only in regions which had not previously been studied, such, for example, as Yukon, the Lake Superior district, and subtropical Florida, but also in regions where our knowledge was presumably more complete. Even in eastern North America new species are constantly coming to light, and seven New England species were detected for the first time during the past year. It will doubtless be a long time before knowledge of the American Hepaticae can approach in thoroughness that of the European countries.

In comparing our species with those of other regions a very striking resemblance becomes apparent between our flora and that of Europe. In fact over 200 of our species (223) grow also in Europe and it is probable that this number will be increased as time goes on. The resemblance is especially great when northern species are considered and the number of species which grow north of the United States and are not found in Europe is very small indeed. In fact, as Underwood noted long ago, the Hepaticae of the whole circumpolar region extending across Europe, Asia and North America are exceedingly uniform. When we consider the species of the southern United States the diversity becomes more and more marked due largely to the fact that our austral flora contains many tropical elements, some of which are known only from peninsular Florida, while others extend much farther northward.

When we go south into Mexico and Central America and penetrate also the islands of the Caribbean Sea, the character of

the hepatic flora changes in a marked degree. Although the number of individuals is no greater than in many northern regions and is probably less than in certain alpine or arctic localities, the number of species increases greatly. This is true particularly of the *Lejeuneae* and of such genera as *Riccardia*, *Frullania*, *Radula*, *Porella*, and *Plagiochila*. Our knowledge of these genera is still very incomplete indeed, and it is difficult and perhaps not profitable to compare the Hepaticae of tropical North America with those of other regions.

The relationship of our tropical flora with that of Africa is certainly not close, although a few of our species are found in Africa. There is certainly nothing at all comparable with the close relationship which exists between our northern flora and that of Europe.

Dr. Evans also discussed the recent studies of the morphology of the leafy Hepaticae in regard to (1) regeneration, (2) organs of vegetative reproduction, and (3) branching.

Under the title of "Notes on the Ricciaceae," Miss Caroline C. Haynes exhibited excellent drawings of habit and structure of several American species of the genus *Riccia*. The drawings of the surface markings of spores, which have been found of diagnostic value in distinguishing species of *Riccia*, were especially noteworthy. Miss Haynes exhibited also the drawings for the plates that accompanied her revision of the genus *Sphaerocarpos*, published in 1910.

"The Mitten and the Underwood Collections of Hepaticae" were described by Dr. Marshall A. Howe. The mosses and hepatics of the herbarium of William Mitten of Hurstpierpoint, England, were purchased by the Garden in 1906. This collection ranked among the largest of its kind and was said to contain 50,000 specimens, of which about one third were Hepaticae. For nearly half a century Mr. Mitten received for study and determination most of the foreign collections of mosses and hepatics that fell into British hands, such as those made by the naturalists of the famous Challenger Expedition, the Transit of Venus Expeditions, the Voyage of *H. M. S. Herald*, by Bishop Hannington in Central Africa and by various other British explorers and

missionaries in remote parts of the world. These collections brought to him a great wealth of interesting forms on which new species and genera were established and these original materials or "types" add much to the value of the Mitten herbarium. A list of names of places and countries from the titles of Mitten's published papers illustrated the wide geographic range of his studies.

At about the same time that the Garden purchased the Mitten herbarium, the hepatic collections of the late Professor Underwood were also acquired. Professor Underwood was for twenty years or more the best-known American student of the Hepaticae and he developed a collection that was especially rich in American material and in European exsiccatae.

A substantial beginning has been made in combining the Hepaticae of the Mitten and Underwood collections with those of the general Botanical Garden and Columbia University herbarium. It was suggested that a desirable step in the line of progress would be the devotion of one or two glass houses to the cultivation of the Hepaticae. That a greenhouse filled with living Hepaticae can be made attractive to the general public as well as generally interesting and useful to botanists has been well demonstrated in the botanical garden at Hamburg.

A. B. STOUT.

NOTES, NEWS AND COMMENT.

Dr. C. L. Shear, of the United States Department of Agriculture, recently spent several days at the Garden before sailing for Europe, where he will spend several months in the study of fruit diseases.

Frederick H. Blodgett has resigned the position of acting professor of biology and geology in Roanoke College to assume the duties of plant pathologist and physiologist at the Texas Experiment Station which position was made vacant by the death of Dr. R. H. Pond.

Dr. Arthur Hollick, curator, returned April 16, from a six months' leave of absence granted for the purpose of enabling him

to continue his work upon the flora of Alaska for the United States Geological Survey.

Mr. E. W. Berry, instructor in paleobotany in Johns Hopkins University, recently spent several days at the Garden examining the fossil plant collections of the coastal plain region.

A commission of distinguished scientists at the head of the German Museum of Munich, the greatest technical museum in Europe, spent the forenoon of April 11 at the Garden inspecting the museum collections and conservatories. Among the chief members of the commission were Dr. Oscar von Miller, president of the museum, Count Podewils-Duernitz, honorary president and secretary of the state of Bavaria, Dr. von Borscht, mayor of Munich, and Professor von Dyck.

Professor J. C. Arthur and Dr. Frank D. Kern, who are engaged in monographing the plant rusts for "North American Flora," recently spent a few days with Professor F. E. Lloyd at the Alabama Polytechnic Institute, making it the center of field operations in the study of the alternate hosts of certain species whose life histories are imperfectly known.

A series of prizes is to be offered by a member of the Torrey Botanical Club for the best popular article on some phase of our local flora covering the range prescribed by the Club's preliminary catalogue of 1888. The first prize will be $25.00, the second prize $15.00, and for the five next best articles a year's subscription to *Torreya*. More complete information can be had by addressing Mr. Norman Taylor, the editor of *Torreya*.

In conservatory range, house no. 4, there are in flower two plants of unusual interest. One of these is *Medinilla magnifica*, a native of the Philippines, where it grows in humid situations from sea-level to elevations of five or six thousand feet. Its flower clusters are of a beautiful pink, hanging in great profusion from the spreading branches. It is a stately relative of the modest little meadow beauty, *Rhexia virginica*, growing in sandy swamps in the eastern parts of the United States. The other plant referred to is the Honduras Sarsaparilla, *Smilax ornata*, a

native of Central America. It forms a beautiful pole plant, as shown by the two specimens in this house. The plants were secured on one of the Garden expeditions to British Honduras.

In the next house, no. 5, the gasterias and aloes are in their glory, the long wand-like flower clusters of the former being especially graceful. The colors are mainly pinks and greens, beautifully blended. Of unusual appearance, both in color and form, is *Gasteria planifolia;* its flowers are three fourths of an inch long, the lower portion globose, white flushed with rose, abruptly narrowed into a neck which is striped with green.

At the other end of the range, in house no. 11, is a plant of the Chinese dwarf banana, *Musa Cavendishii*, just forming a fruit cluster. In houses 13 and 14 are plants of *Callistemon*, in several species, now forming their curious flower clusters, much resembling a bottle-brush in shape, hence the common name of bottle-brush tree. In house no. 13 are two plants of the palm *Trachycarpus excelsus*, a native of Japan, bearing showy clusters of bright yellow flowers.—G. V. N.

Meteorology for March.—The total precipitation recorded for the month was 6.36 inches. Maximum temperatures were recorded of 47° on the 9th; 57° on the 14th; 63° on the 18th, and 68° on the 29th. Also minimum temperatures were recorded of 15° on the 8th; 21° on the 17th, and 19° on the 22d and on the 26th.

ACCESSIONS.

MUSEUM AND HERBARIUM.

200 specimens of fungi "North American Uredinales." (Distributed by Elam Bartholomew.)

5 specimens of fungi. (Collected by Mr. A. B. Stout.)

163 specimens of fungi from Europe. (By exchange with Dr. H. D. House.)

3 specimens of *Ceriomyces bicolor* from Michigan. (By exchange with Professor L. H. Pennington.)

9 specimens of fungi from Seattle, Washington. (By exchange with Mr. S. M. Zeller.)

1 specimen of fungus from Alabama. (By exchange with Dr. F. D. Kern.)

1 specimen of fungus from Ohio. (By exchange with Dr. Bruce Fink.)

4 specimens of *Gelidium* from England. (By exchange with the Royal Gardens, Kew, England.)

1 specimen of *Myosotis micrantha* from North America. (By exchange with Herbarium of Harvard University.)

1 specimen of *Talinum triangulare* from Nassau, N. P., Bahamas. (By exchange with Mr. L. J. K. Brace.)

11 specimens of flowering plants from Arkansas. (By exchange with the Biological Survey, Washington, D. C.)

2 specimens of mosses from Missouri. (By exchange with Mr. B. F. Bush.)

18 photographs of succulent plants from North America. (By exchange with the United States National Museum.)

100 specimens "Kryptogamae Exsiccatae" Century 19. (Given by the Natural History Museum, Vienna, Austria, for the Columbia University Herbarium.)

PLANTS AND SEEDS.

1 plant of *Pinus Bungeana*. (By exchange with Bureau of Plant Industry.)

3 plants for the conservatories. (By exchange with Mr. A. J. Manda.)

3 plants of *Opuntia inermis*. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

2 plants of *Carex aquatilis*. (Given by Mr. A. B. Stout.)

60 plants of *Coryphantha cubensis*, from Cuba. (Collected by Dr. J. A. Shafer.)

25 plants of bloodroot. (Given by Mrs. W. A. Hallock.)

15 plants for conservatories, from Cuba. (Given by Brother Leon.)

361 plants for conservatories, from Cuba. (Collected by Dr. N. L. Britton and Mr. J. F. Cowell.)

11 plants derived from seed.

52 packets of Cuban seed. (Collected by Dr. N. L. Britton and Mr. J. F. Cowell.)

1 packet seed *Cajanus Cajanus*. (Given by Dr. H. H. Rusby.)

2 packets seed. (Given by Mr. Jas. L. Clark.)

1 packet seed of Chinese bean. (Given by Dr. H. H. Rusby.)

58 packets seed. (By exchange with Botanic Garden, St. Petersburg, Russia.)

26 packets tree seeds. (Given by Monterey Tree Growing Club.)

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EDITOR

FRED J. SEAVER

Curator

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WILD PLANTS NEEDING PROTECTION.[1]

2. "SPRING BEAUTY" (*Claytonia virginica* L.).

(WITH PLATE XCV.)

In wet meadows, on grassy banks and even shady woodlands the Spring Beauty covers the ground in May with quantities of white flowers. It blooms consecutively for two or three weeks, opening a new blossom each day, gradually lengthening out its racemes, till sometimes they have borne as many as fifteen flowers. These measure half an inch or more across, have five white or pale pink petals, veined with rose-color; the stamens are five with pink anthers, and the style is three-lobed. There are two fleshy spreading sepals and the pedicels lengthen gradually from one half to an inch in length and become reflexed as the three-angled capsule matures. Half-way down the stem below the raceme, two narrow fleshy leaves, three or four inches long, clasp the stem, and a few basal ones arise from the large tuberous root which is buried rather deeply in the ground. Usually only the flowering stems are picked, so that the plant survives, but it will make no seed and stand little chance of spreading. The seeds are brown, reniform, slightly roughened, and the embryo is curved.

The Spring Beauty was named by Linnaeus in 1753 in honor of John Clayton, an American botanist and correspondent, who wrote, in 1743, a flora of Virginia. It was first figured by Plukenet in his Phytographia in 1691. There are about twenty-five

[1] Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

species of *Claytonia* known to grow in northern North America, of which three occur in the eastern United States, one of these with broader leaves, *C. caroliniana* Michx., having about the same range as *C. virginica*, from Nova Scotia southward along the Alleghanies to Georgia and Texas.

They belong to the Purslane family, or Portulacaceae, with which they agree in their fleshy leaves, and flowers that bloom for a short time. The family is a large one, but the plants are usually small, few of them with showy flowers like *Portulaca grandiflora*, which occasionally escapes from cultivation.

ELIZABETH G. BRITTON.

BOTANICAL EXPLORATION IN ORIENTE, CUBA.

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: Embarking from New York November 15, 1910, I arrived at Antilla November 21. Crossing Nipe Bay next morning to Preston, there to await the uncertain arrival of the coast-wise steamer to Baracoa, which was reached on the evening of November 25, I soon found myself comfortably installed in the house of my good friend and fellow-townsman, Mr. Charles Rees, of the Piloto Mining Company.

Owing to the heavy rains of an unusually late rainy season, the trails were all but impassable, and the streams frequently unfordable, so that no satisfactory arrangement could be made for the establishment of a base on El Yunque, and I concluded it would be more practicable to go there afoot with the least equipage possible. Leaving Baracoa at noon, accompanied by two stout boys, wading Rio Duaba, thence to and up the narrow but very fertile valley of Arroyo Henequen, which stream it was necessary to cross twenty-one times before reaching the bohio of a tenant on Tabajo, we reached the finca of Mr. W. H. Bemis, situated high up in the foothills and close to the base of El Yunque. Some collections were made along the aforementioned arroyo and in the hills before nightfall. As it rained heavily during the night, my host, who was also to be my guide, informed me next morning that it

would be impracticable to go to the summit for several days; consequently the morning was spent in collecting among the foothills, but as it still continued to rain, thus decreasing the prospects of an early ascent, and as the intervening streams would respond accordingly and probably make it impossible to return to Baracoa when desired, it seemed best to return at once. On the way back we found that Rio Duaba had risen considerably and was unfordable afoot. Fortunately a friendly Cuban with a mule happened along and assisted us in crossing and Baracoa was reached about dusk.

Through the kindly offices of Mr. J. G. Diesend, of the Baracoa Fruit Company, passage was secured to Rio Yamuri on a passing fruit steamer during the night of December 5. Here I was welcomed by Mr. Thomas Forrestal, of the Banana Elevator Company, whose kindly hospitality and wise guidance greatly facilitated my work among the high coastal cliffs and deep river gorge in the vicinity, also the region eastward to Cape Maisi, from which I returned by a more southerly route to Rio Yamuri and finally, after a delay of some three days due to flooded streams, returned overland to Baracoa, passing through Mata, a small hamlet situated on a beautiful little bay of the same name. This is undoubtedly the Mata referred to by Charles Wright in a letter to Dr. Asa Gray from Baracoa.

On December 18, I started on another and more successful attempt to reach the summit of El Yunque, which was accomplished the following day, but as there was attractive collecting all the way up, there was little opportunity to explore much of the top, which is flat and mostly covered with a second growth of shrubbery, having been a caffetal previous to the Ten Years War.

Another opportunity to get into the Sierra de Moa region, from which so much interesting material was secured the previous winter, presented itself on December 22, Mr. Rees having invited me to accompany him to Camp La Gloria of the Piloto mining properties. The trip westward along the north coast by a small motor boat to a point on Moa Bay was a very rough one, but the route into the mountains was over a much better trail than

that traversed a year ago. The heavy rains, however, together with the traffic of pack animals, had played such havoc that we were frequently compelled to dismount and finally it was necessary to abandon our mounts before camp was reached just about dusk the following day. The camp was situated by a small stream on an irregular plateau lying between the mountain range and Rio Yaguani at an altitude of about 2,500 feet. It was in charge of Mr. E. La Londe, assisted by Mr. W. H. Bemis, whose kindly interest in our work I had experienced on former occasions. The camp was conducted according to American standard of comfort, in so far as that was possible under the adverse conditions encountered, and they did all that was in their power to aid me during the eight days that I remained there. The region is covered with a dense growth of shrubs and small trees, a few large trees occurring along the streams. There is also an occasional old pine tree, apparently the remnant of an ancient forest, younger pine trees occurring only along some of the mountain sides. There is little or no soil, but the surface is covered with a water-soaked mat of moss and humus; trunks and branches are generally enveloped in moss also. Beneath this is a layer of earthy limonite (iron ore) deposited upon the foundation of serpentine rock. The object of the camp was to ascertain the depth of this deposit and estimate the quantity of ore available. This was done by drilling to rock bottom at the intersection of parallel lines one kilometer apart running at right angles and as every third one of these was cut through the jungle, this afforded access to an otherwise inaccessible area. Most of the collecting was done along these trochas, but the mountain sides were examined on the way to the camp and again on my return to the coast. A very rocky stream was also visited and its course examined for some distance. Incidentally, I got as far east as to site Camp San Benito, visited last winter. The little clearing was covered with a dense growth of fireweed (*Erigeron*) and small-fruited tomatoes. On this occasion Mr. La Londe accompanied me and we were overtaken by rain and nightfall several miles from camp on a rough and rocky trocha with the dismal prospects of spending the night in the bush in

misery. This, however, was obviated by one of the searching parties with lanterns, etc., sent out from camp to find us, but it was well toward midnight before we reached camp.

I left Camp La Gloria January 1, 1911, in a drenching rain, and, as it had been raining during most of my stay, the trail became all but impassable, so that of the seven mules starting for the coast that morning but four reached it; the others becoming exhausted were abandoned at various grassy plots along the trail. It was nearly dark when the storage camp on the coast was reached, and I was informed that the small sailboat which was to take me back to Baracoa had arrived a short time before and was anchored in the bay. Next morning the weather conditions were such that the captain would not venture out to sea that day or the following day, thus giving me an opportunity to examine the vegetation along the shore of Moa Bay. The coastal formation is of conglomerate limonite or iron stone and, to my great surprise, carried with it the vegetation known to me heretofore only from the mountains; thus tree-ferns grew within fifty feet of salt water and many mountain shrubs almost touched an occasional mangrove, *Rhizophora*, which occurred very sparingly at this point.

Early next morning our little craft ventured out and beat its way eastward with difficulty, reaching Taco Bay, the protection of which we sought for the night; Baracoa was reached late in the afternoon of January 5. My anxiety as to the condition of the moisture-laden specimens was greatly relieved when I found that they were in good condition. It required about a week of constant attention to get the material properly dried under the adverse weather conditions. The driers were kept dry and warm by a process new to me, Lizzie, the cook, having suggested the bake-oven as the proper medium to secure the desired results. In the meantime, I succumbed to an attack of a low, enervating fever, which wholly incapacitated me for about ten days and left me in no condition to attempt the contemplated trip overland to Guantanamo, which I was informed was very tedious and difficult and would take over a week's time. But as I desired very much to collect across the island, I arranged with a boatman,

who was to sail around to Guantanamo, to take my luggage to that place and to stop at the town of Imias on the south coast and pick me up, I having intended to cross over on foot consuming several days to collect along the route, but when the time came for doing this, the boat-man insisted on postponing the trip for a week; to this I could not agree, so this scheme was also abandoned. As there was a coast-wise steamer for Guantanamo in three or four days, I concluded to make the trip, at least as far as Bermejal, well across the divide near which there is said to be a grove of *Juniperus*, specimens of which it is very desirous to obtain, as the relationship of this Cuban tree is not well understood. This was attempted on January 30, going on horseback to Sabanilla, after experiencing considerable difficulty in crossing the swollen waters of Rio Miel. From here I proceeded into the hills afoot, up a very muddy and difficult trail until after dark before coming to the shack of a friend of the Cubano I had with me. Here I swung my hammock for the night. Next morning the weather conditions were by no means encouraging, and it was with difficulty that I secured an additional man to accompany me. The weather turned out to be worse than predicted, heavy rains and cold winds continuing all day, so that progress was slow and collecting difficult. It was after three o'clock before the next shack was seen. This we entered for shelter and as we had taken no rations with us, we were glad to partake of the meager food that the occupants provided. In lieu of coffee they served a concoction of the leaves of some zinziberaceous plant, well sweetened and very hot. This the woman assured me was very good for colds and to prevent fever, which (as said by these people) is sure to follow such exposure as we had passed through unless some precaution is taken. No further attempt was made to proceed. We remained here until the next day, building a fire in the open room, in which we swung our hammock, to keep warm during the night. Realizing that it would be impossible to proceed further and hoping to return to Baracoa in time to catch the steamer which was due the next day, we started back in the morning, progress being impeded by the illness of one of the men; and it was with

difficulty that we reached the home of his friend, where I hired two mules, divided our water-soaked collections, and proceeded to Baracoa, arriving there late at night. The region passed through is a very rough one after leaving Sabanilla, between which and Baracoa a good road leads up the valley of Rio Miel, through a gravelly and conglomerate region. The hills south of Sabanilla are of serpentine formation, reaching an altitude of about 1,000 feet; many of the higher ones are covered with earthy, red limonite supporting groves of *Pinus cubensis*. South of the divide the soil is light-yellow, containing numerous small angular particles of milky-white quartz and supporting a rich vegetation.

On the evening of the next day, I embarked for Guantanamo, reaching the port of Caimanera on the morning of February 3 and Guantanamo that evening. The next day being Sunday, I could not get my baggage until Monday morning. I occupied the time until February 6 in drying the wet material brought from Baracoa and making arrangements to get into the hills to the northward. In the latter, our very good friend, Mr. Theodore Brooks, aided me greatly.

Leaving Guantanamo in the morning with a guide, two horses, and a pack animal, I arrived at La Perla, an extensive coffee estate in the prosperous times before the Ten Years War and adjoining Monte Verde, another coffee estate, famed as being the eastern headquarters of Mr. Charles Wright. The region is one of limestone, and virgin forests abound. The old caffetals have also become reforested with coffee, pimento, various species of *Citrus* and an occasional *Morus*, prominent members of the second growth. The altitude is about 2,000 feet; the atmosphere is very humid and it is said to rain about three hundred days in the year. Ferns, orchids, and Peperomias abound everywhere and the forest floor is covered with a luxuriant growth. There are large groves of Palma Bobo, *Euturpe* sp. The high and extensive limestone cliffs known as the Farallones de La Perla, with its various and peculiar exposures, supported a rich and interesting flora. A small area of serpentine formation a few miles northward is covered by a pine-land flora. Monte Verde

itself is very hilly and contains much old pasture-land of no great botanical interest. In the ruins of the old stone mansion in which Wright lived, several large trees are now growing and the walls are covered with a great variety of ferns. The falls of Rio Palenque, also known as Monte Verde Falls, were visited and some interesting collecting was had in the rich tropical forest above the falls. The deep gorge below the falls, which is cut through a peculiar stratified formation the like of which I had not heretofore seen in Cuba, no doubt affords plant species unusually encountered elsewhere. It was impracticable, however, to make an examination of it at this time. My stay of about ten days in this region was under unusually favorable circumstances, as my host, Mr. Charles Maurel, not only provided me with unusual comforts, but took the greatest interest in my work and accompanied me on most of the excursions made in this prolific region. We secured an unusually large number of specimens in spite of the almost constantly rainy weather encountered while there.

I returned to Guantanamo, February 28, with a large lot of damp or wet material which required several days to dry and make ready for shipment to Santiago. Here, Mr. Jennings S. Cox, Jr., of the Spanish American Iron Company, supplied me with much valuable information concerning some of the places visited by previous botanists. He also advised me as to the most advantageous route to reach the summit of Gran Piedra, the high mountain lying some distance east of Santiago and reported to have an altitude of 5,000 feet, which, however, is probably somewhat exaggerated. Gran Piedra was approached by way of Firmeza, which was reached by the railroad of the Juragua Iron Company, whose mines are situated there. Passage on the railroad and accommodations at the officers' clubhouse were kindly provided for me by Mr. De Beruirn Whitaker, vice-president and general manager of the company, and the various officials at the mines advised and entertained me while at Firmeza. I started for the mountain top on the morning of February 4 with a very indifferent guide and a boy, going up steep grassy hillsides. Mango in stunted form is frequent and about the only

tree met with, as it is very dry for the first 2,000 feet of elevation, after which the ravines become more interesting, frequently have water in them, and tree-ferns and other moisture-loving plants become more numerous as the altitude increases. The tree-fern, of which there are several species, is quite abundant about the summit, especially on the north side of some of the lower ridges. The big rock was reached late in the afternoon and a considerable collection was secured by nightfall. The night was spent under an overhanging rock, which afforded protection from rain and wind, but it was necessary to build a fire to keep comfortable. Collecting was resumed shortly after daybreak next morning in a dense fog and a dripping vegetation, and many kinds of ferns, orchids, and other plants that I had not seen elsewhere were secured. I started on the descent about one o'clock, collecting on the way down through the upper and moister region, reaching Firmeza shortly after dark with all the party well loaded with plants, but regretting that I had not made arrangements providing for several days' stay at the summit.

Monday morning I returned to Santiago, dried and packed my material, and left for Antilla, from which port I embarked, arriving in New York on the morning of March 15, 1911.

Respectfully submitted,

J. A. SHAFER.

JACQUIN'S SELECTARUM STIRPIUM HISTORIA ICONIBUS PICTIS.

Through the liberality of Mr. Andrew Carnegie, the library of the New York Botanical Garden has been able to secure a copy of what is undoubtedly the most valuable single volume in modern botanical literature, that is, in the botanical literature of the last one hundred and fifty years. It is of especial value to the New York Botanical Garden, in view of the systematic botanical exploration of the West Indies by this institution for some years past, in that it is devoted exclusively to the plants of the Antillean region and adjacent South America.

In the year 1752, Nicolaus Joseph Jacquin, then 25 years of

age, went to Vienna to complete his medical education. He was already an enthusiastic student of natural history, especially botany, and attracted the attention of the emporor, who commissioned him to visit the West Indies for the purpose of collecting materials for the imperial cabinet. With several assistants, he spent about four years (1755–59) in carrying out this task, collecting a large amount of material, especially plants, both living and dried. The year following his return he published a brief enumeration of the plants observed which were either new or otherwise noteworthy; this was followed in 1763 by a folio work in which were given full descriptions of the plants mentioned in the earlier enumeration, and copper-plate illustrations of many of them.

Our recent acquisition is a later edition of the last-mentioned work, issued without title-page date in 1780 or 1781, in which the text has been entirely revised, and instead of 183 copper-plates there are 264 colored plates copied entirely by hand from the author's original paintings. The work is beautifully done, and a number of species are illustrated which did not appear on the plates of the first edition.

Of this work with hand-painted plates the edition is stated by different authorities as 12 or 18 copies, and of course it has always been extremely scarce. A copy was sold in 1818 for about $400.00, and probably not more than two or three have changed hands since that time; it is not unlikely that ours was the last to remain in private hands. There are copies in Vienna, Berlin, Göttingen, Dresden, the library of the British Museum, and the Library of Congress at Washington; but there is none at Kew, and it is possible that ours is the only copy in a strictly botanical library.

JOHN H. BARNHART.

SPRING AND SUMMER FLOWER SHOWS.

The floral exhibitions of The Horticultural Society of New York, given in coöperation with the Garden, were inaugurated with the exhibition of May eleventh and twelfth. A special

exhibition was held on May twenty-fifth and twenty-sixth, consisting primarily of a large display of lilacs by Mr. T. A. Havemeyer. The exhibition for June occurred on the eighth and ninth, and the regular July exhibition will also be held this year in June, on the twenty-ninth and thirtieth. There will therefore be no regular exhibition in July, and that for August will occur toward the end of the month. The exhibitions are held in the halls devoted to paleobotany on the ground floor of the Museum building. The prizes at these exhibitions are offered by the New York Botanical Garden, and are awarded through the exhibition committee of the council of The Horticultural Society of New York.

The flowers exhibited, after delighting the many who come to view them, are donated at the conclusion of the exhibitions to hospitals and other similar institutions, thus giving many more, unable to attend, the opportunity of seeing these beautiful products of the art of the horticulturist.

At the exhibition on May 11 and 12, prizes were offered for collections of the flowers of shrubs and trees, herbaceous plants, bulbs, and for wild flowers and other plants. The F. R. Pierson Co. took the first prize for the classes of shrubs and trees, Mr. T. A. Havemeyer, A. Lahodny, gardener, taking the second. Mr. Havemeyer took the first prize for a collection of narcissus. For a collection of wild flowers, the first prize went to Mr. E. B. Southwick, who also secured a special prize for an interesting collection of the English daisy, *Bellis perennis*. Special prizes were also awarded as follows: Lager & Hurrell, for orchids; Jas. A. Macdonald, Richard Wagner, gardener, for gloxinias; L. C. Tiffany, John Miller, gardener, for four plants of self-colored calceolarias; Adolph Lewisohn, John Canning, gardener, for three excellent plants of *Calceolaria hybrida*.

The exhibition of May 25 and 26 had for its main feature a large display of lilacs, over sixty kinds, exhibited by Mr. T. A. Havemeyer, who has a very large collection of these delightful shrubs at his place at Glen Head, Long Island. The gem of this display was Mad. Antoine Buchner, with its lavender buds, opening to a white, daintily flushed with rose. Its flower clusters

are large and well-formed, its color clear and crisp, and the foliage perfect. Among others, the following were especially noteworthy: Dame Blanche and Miss Ellen Willmott, pure white, double; Montaigne, white flushed with lilac; Sieboldi, with creamy white buds, opening almost white, with just a faint indication of cream; Montgolfier, dull lilac, the involute margins exposing the paler outer surface, giving the flowers a margined appearance; Cristophe Colomb, pale lavender, large clusters; Edmund Boissier, large flowers of deep bright lilac; Reaumer, bright lilac, full clusters; Milton, deep lilac; Pasteur, deep bright lilac; Monument Carnot, almost a light blue; Volcan, full clusters of deep bright lilac flowers; and Negro, deep red purple. Mr. Havemeyer also made large exhibits of the flowers of shrubs and trees, azaleas, and of tree peonies. An interesting exhibit was a seedling hybrid of the tree peony, *Paeonia Moutan*, with *Paeonia lutea*, decorative in its fully double flowers, the petals yellow, ruby at the base.

Mr. John Lewis Childs exhibited an attractive vase of *Gladiolus Panama*, the flowers a bright pink; also vases of Silver Sheen and Niagara, of the same genus. The New York Botanical Garden arranged an exhibit of trees and shrubs, herbaceous plants, and tulips.

The exhibition held on June 8 and 9 was the largest ever given by the Society during the summer. The largest exhibitor here was again Mr. Havemeyer. The most attractive feature of this exhibition was a large and magnificent display of herbaceous peonies made by him. Over two hundred vases were shown, containing over twelve hundred blooms. There were many delightful things among these, ranging all the way from the purest white, through pink and rose, to the deepest crimson, and in every form, from the single flower, with its center of yellow stamens, to the large fully double ones in which the stamens were entirely replaced with petals. This collection entirely filled one of the center tables, and also considerable floor space.

The first prize was awarded to Mr. Havemeyer for the largest and best collection of these flowers, not less than six flowers of

each variety; his display contained about one hundred and ninety vases. The first prize also went to him for the best six flowers each of white, light pink, rose and crimson varieties, and for the best collection of singles, three flowers of each. The F. R. Pierson Co. took second in all of these.

Being a little too early for roses, only three entries were made in this class. Gen. E. A. McAlpin, J. Woodstock, gardener, took first prize with a choice collection of sixty-five varieties, the second prize going to Mr. H. Darlington, P. W. Popp, gardener, for a collection of fifty-nine varieties. A large collection of flowering shrubs and trees secured the first prize for Mr. Havemeyer, A. Lahodny, gardener, the second going to Mrs. F. A. Constable, Jas. Stuart, gardener. Among the notable things in the collection of Mr. Havemeyer were some charming forms of the genus Philadelphus, commonly known as mock orange or syringa: Lemoine's Glory, with large striking flowers; Mer de Glace; Coquette; Manteau d'Hermine, very graceful and florifer-ous. Another pleasing plant was an azalea with pure white crowded flowers, delightfully fragrant. It resembled a compact form of *Azalea viscosa*.

The first prize for the best collection of rhododendrons and azaleas, or either, went to the F. R. Pierson Co., for a fine display of rhododendrons, the second being secured by Mr. Havemeyer. The class of herbaceous plants was not well represented, the single collection taking the first prize for Mr. Henry Siegel, Thos. Aitchison, gardener. Of irises, there were several entries. A large collection of fine flowers, some ninety odd vases, brought the first prizes to Mr. Havemeyer; a smaller collection of twenty-seven vases, of fine flowers, gave the second prize to Mrs. F. A. Constable.

While there was not a large exhibit of orchids, there were some very choice plants displayed. Lager & Hurrell took the first prize for the best six orchid plants, six varieties. For three orchid plants, three varieties, the first prize went to the same parties, the second to Mr. Clement Moore, J. P. Mossman, gardener. A superb plant of *Cattleya Gigas* gave the first prize for the best single orchid plant to Mr. Moore, an unusual form of the same

species securing second prize for Lager & Hurrell. Mr. Moore also took first prize for a collection of cut orchids.

A special prize was awarded to Mr. Henry Siegel for *Lilium microphyllum*, a recent introduction from China by Mr. Wilson, and exhibited in May at the International Flower Show in London. Other special prizes were awarded as follows: Mrs. F. A. Constable, for vases of campanulas; John Lewis Childs, for a collection of yellow callas; H. Darlington, for a collection of gladiolus and sweet peas.

An attractive display of herbaceous peonies and of flowering shrubs and trees was made by the Garden.

GEORGE V. NASH.

SUMMER LECTURES, 1912.

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

July 6. "The Botanical Exploration of Cuba," by Dr. N. L. Britton.

July 13. "Aquatic Flowering Plants," by Dr. John H. Barnhart.

July 20. "Fossil Plants and Their Significance," by Dr. Arthur Hollick.

July 27. "Some Floral Features of Southern Florida," by Dr. Marshall A. Howe.

August 3. "Indian Agriculture," by Dr. A. B. Stout.

August 10. "City Trees: Their Planting and Protection," by Mr. Carl Bannwart.

August 17. "Exploring the Pacific Coast—II. Washington to Oregon," by Dr. W. A. Murrill.

August 24. "Grasses and Some of Their Uses," by Mr. George V. Nash.

August 31. "Exploring the Pacific Coast—III. Oregon to California," by Dr. W. A. Murrill.

September 7. "Plant Parasites and Some Means of Controlling Them," by Dr. F. J. Seaver.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. The doors will be closed at 4:05, and opened again at 4:15 to admit those arriving late.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

NOTES, NEWS AND COMMENT.

Mr. Fred J. Seaver, curator, received the degree of Doctor of Philosophy at the Iowa State University on June 12.

Professor Eduard Strasburger, the eminent plant cytologist of the University of Bonn, Germany, died May 20, at the age of sixty-eight.

Dr. A. B. Stout, director of the laboratories, spent a week during June in Washington and Philadelphia, where he inspected various lines of work being done in plant breeding.

Miss Emily Topp has been granted a research scholarship at the Garden for the month of August to continue her studies on variegation in *Miscanthus*.

Professor Douglass H. Campbell, of Leland Stanford University, California, visited the Garden June 15, on his way around the world in search of special plant material for studies in morphology and systematic botany.

Dr. John K. Small, head curator of the museums and herbarium, was given the honorary degree of Doctor of Science at the one hundred and twenty-fifth anniversary of Franklin College, at Lancaster, Pa., June 13.

Dr. B. O. Dodge, of Columbia University, was awarded a research scholarship for the month of June to assist him in investigations on the Ascobolaceae, a family of inconspicuous fungi not very well known in this country.

Mr. Fred D. Fromme has been awarded a grant of $50 from the Students Research Fund to assist him in collecting and studying the local parasitic fungi, especially those belonging to the group of plant rusts.

Mr. W. W. Eggleston, of the United States Department of Agriculture, was awarded a research scholarship at the Garden for the month of May to assist in carrying on research on various poisonous plants and on the taxonomy of the plants of the apple family.

The water-lilies in the aquatic garden are now in full bloom. The first blossoms appeared about June 1, and they will continue in great profusion until checked by the cold weather. *Castalia Marliacea carnea* has flesh-colored flowers, while the variety *rosea* has flowers a little deeper in color, making it more striking. Of most vigorous habit, is *Castalia alba candidissima*, with pure white flowers of great size. *Castalia tuberosa* is another white-flowered form.

Dr. E. B. Copeland, dean of the College of Agriculture, Los Baños, Philippine Islands, paid a visit to the Garden on June 13. The college is one of the branches of the University of the Philippines, and is situated in a beautiful locality at the base of Mount Maquiling, about forty-five miles from Manila. Although work began only three years ago, the institution has made very great progress, and lasting results of a most beneficial nature to the islands are rightly expected, as the work is at once scientific and highly practical. Dr. Copeland leaves San Francisco on his return to the East at the end of the month.

Through the assistance of Professor P. Baccarini of Florence, Italy, the New York Botanical Garden has recently secured two Bizzaria plants. One of these plants is now about four feet in height and is bearing fruits which show decidedly the mixture of orange and lemon tissue. The Garden has also purchased living plants of the following chimeras (graft hybrids); *Cytisus Adami*, *Crataego-mespilus Asnieresii* and *Crataego-mespilus Dardari*.

The American Association of Museums held its seventh annual meeting in New York during the week beginning June 3. On Tuesday, June 4, sessions were held and the members were entertained at the American Museum of Natural History. On Wednesday, a morning session was held at the Metropolitan Museum of Art, where the members were the guests of the Museum until evening, when a session was held at the Museum of Natural History. Thursday was Brooklyn day, the Brooklyn Institute of Arts and Sciences being the host; the forenoon was spent at the Central Museum and the afternoon at the Children's Museum. An evening session was held at the Museum of Natural History, after which the Association adjourned to meet next year in Philadelphia.

A large number of the members, however, remained until the end of the week. On Friday, they were the guests of the New York Zoölogical Park during the morning and at luncheon. In the afternoon, arrangements were provided for an inspection of the grounds, conservatories, and museum of the New York Botanical Garden, followed by a complimentary dinner in the evening by the director-in-chief, Dr. N. L. Britton, at the "Hermitage" in Williamsbridge. Dr. W. P. Wilson, director of the Philadelphia Museums and treasurer of the Association, in responding to the toast of "our guests," recalled the fact that the first meeting, at which the association was organized, was held in New York in 1906, and that it was at the Museum of the New York Botanical Garden that the report of the committee on organization was submitted and adopted. On Saturday, the Staten Island Association of Arts and Sciences provided an automobile trip through Staten Island, followed by a reception at the museum building of that institution.

Meteorology for April.—The total precipitation recorded for the month was 2.28 inches. Maximum temperatures were recorded of 80° on the 6th, 61° on the 11th, 75° on the 16th, and 70° on the 24th. Also minimum temperatures were recorded of 25° on the 4th, 28° on the 9th, 35° on the 20th, and 36° on the 27th.

Meteorology for May.—The total precipitation for the month of May was 3.45 inches. Maximum temperatures were recorded as follows: May 7, 77°; May 21, 90°; May 27, 85°. Minimum temperatures were as follows: May 1, 33°; May 14, 42°; May 23, 49°; May 31, 50°.

ACCESSIONS.

Museums and Herbarium.

414 specimens of lichens, hepatics and mosses from Canada. (Distributed by Mr. John Macoun.)

1 specimen of *Tetraplodon australis* from Massachusetts. (By exchange with Mr. Frank Dobbin.)

11 specimens of *Fissidens* from South America. (By exchange with the Natural History Museum, Paris.)

1 specimen of *Grimmia calyptrata* from Arizona. (By exchange with Dr. C. F. Millspaugh.)

10 specimens of marine algae from California. (By exchange with the University of California.)

9 specimens of mosses from Missouri and Arkansas. (Given by Mr. B. F. Bush.)

3 specimens of mosses from Newfoundland. (By exchange with Mrs. A. R. Northrop.)

2 specimens of *Bruchia* from North America. (By exchange with Mr. Jules Cardot.)

3 specimens of mosses from Washington. (By exchange with Mr. George B. Kaiser.)

10 specimens of hepatics from New York, New Jersey, and Connecticut. (Given by Miss C. C. Haynes.)

12 specimens of mosses from Montevideo, Uruguay. (By exchange with Dr. Florentino Felippone.)

1 specimen of *Grimmia tenuicaulis* from Alberta, Canada. (By exchange with Mr. George B. Kaiser.)

2 specimens of the fruits of *Strychnos spinosa* from Miami, Florida. (Given by Mr. Edward Simmonds.)

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EDITOR

FRED J. SEAVER

Curator

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WILD PINK.

JOURNAL

OF

The New York Botanical Garden

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WILD PLANTS NEEDING PROTECTION.[1]

3. "WILD PINK" (*Silene caroliniana* Walt.).

(WITH PLATE XCVII.)

Before the trees cast much shade, while their greens are still so exquisitely fresh and varied, a bright flash of color will attract the eye to the Wild Pink, growing in hilly places on rocks or often in their cracks and crevices with the Saxifrage. The beautiful rose pink and size of its flowers renders it very conspicuous, for it often makes a large patch or cushion with a number of stems about six to ten inches high, each bearing from three to five showy flowers more than an inch across. Each petal is wedge-shaped, with a long, pale white, basal claw enclosed in the tubular, 5-notched calyx and crowned at the summit of each claw by two erect, white appendages. The stamens are immersed in the tube, ten in number, five long and five short with purple anthers and slender white filaments attached at the base of the ovary which terminates in three short styles. The pod is stipitate, developing in the upper half of the withered calyx, splitting at apex into six recurved segments. The seeds are borne on a central column and are small and numerous, kidney-shaped and brown, with a rough surface.

The whole plant is viscid with glandular hairs forming a ciliate margin to the leaves, which are opposite, clasping at base a swollen joint of the stem; usually each stem has three pairs of

[1] Illustrated by the aid of the Stokes' Fund for the Preservation of Native Plants.

leaves decreasing in size upward. The basal shoots have longer leaves, all gracefully recurved, and forming a crowded cluster at the summit of a long strong fibrous tap-root, which often penetrates deep down into some crevice and breaks off when uprooted. For this reason the plant frequently survives, in spite of its showy blossoms, though it is not abundant any longer, where it is frequently picked.

The Wild Pink was described by Thomas Walter in his Flora of Carolina in 1788, and redescribed by André Michaux in 1803 as *Silene Pennsylvanica*. It often grows in sandy or rocky soil on the borders of woods from Maine to Georgia in the Eastern States, along the Alleghanies, and flowers from April to June.

It belongs to the pink family or *Caryophyllaceae* a large family of about seventy genera and over 1,500 species, which are widely distributed, mostly in temperate regions. The generic name *Silene* was given by Linnaeus in 1753 in reference to the viscid hairs and about 250 species are known of which many are showy graceful plants, the showiest perhaps being the Fire-pink, *Silene virginica*, and the most graceful, the Starry Campion, *Silene stellata*.

ELIZABETH G. BRITTON.

WINTER-KILLING OF EVERGREENS.

The destruction of evergreens in the east during the past winter has been wide-spread, due apparently to a combination of adverse conditions. The collections here at the Garden have not been exempt from this visitation. Some forms which have hitherto been considered hardy have proved unstable, while others which have been looked upon as doubtful have not been unduly harmed. In the following list of both coniferous and broad-leaved evergreens, arranged according to genera, the behavior of various species is noted.

The collection of firs, *Abies*, in the pinetum is located on a gentle slope facing the northwest, and subject to the sweep of the winds from that quarter. The plants here are grown as

individuals and not in groups, so they do not enjoy mutual protection. Here the balsam fir, *Abies balsamea*, of the east, burned somewhat, but the leaf-buds were unharmed, so it recovered its accustomed appearance. It stood the test better than *A. Fraseri*, of the southern mountains. *Abies cephalonica*, from the higher elevations in Greece, as a rule is in excellent condition, only individual plants having the leaves burned. *Abies cilicica*, from the higher altitudes of Asia Minor, is burned somewhat, but all the plants recovered. It is not as badly affected as *A. Nordmanniana*. *Abies concolor* has burned on the tips of the leaves in individual plants, but as a rule it is in good condition. *Abies firma*, from Japan, has stood well. *Abies Fraseri* has the foliage badly burned, one or two plants being entirely killed. The others recovered their wonted appearance when the leaf-buds developed. *Abies homolepis*, sometimes known as *A. brachyphylla*, is a Japanese evergreen of stately and attractive habit. It has gone through the past winter without a blemish, making it especially desirable for this latitude. *Abies lasiocarpa* has burned as usual, but all the plants recovered. This has much the appearance of *A. concolor*, but is not so desirable on account of its less hardy character.

Abies nobilis, while always of slow growth in this region, has hitherto stood the winters well. This past winter, however, has been its undoing, for the ends of the leaves burned badly, even when growing in groups, giving the plant temporarily a most unsightly appearance. The leaf-buds are, in the main, unharmed, so its normal appearance will soon prevail. *Abies Nordmanniana*, of the central portions of Transcaucasia, where it forms large forests in the valleys of the higher elevations, has burned badly, even when growing in groups with other plants. Some plants have been killed. This charming conifer, with its dark rich green foliage, is too attractive a plant to dispense with simply because it occasionally burns in severe winters. Seldom is a plant killed. *Abies numidica* has burned badly, some plants being killed. *Abies Picea*, the common silver fir of central and southern Europe, has not been damaged more than is usual with this species. *Abies Pinsapo* is a native of central and southern Spain, forming

large forests on the Sierra Nevada at elevations from four to six thousand feet. In exposed situations it has proved tender here at the Garden, and for this reason its inclusion in the regular collection of firs has been abandoned. In sheltered places, among groups of other plants, it has done well, but is always of slow growth. In the decorative beds at the northwest of the conservatories, range I, are a number of specimens. In some cases these have come through almost without a blemish, while others, with apparently the same exposure and conditions, have been killed outright. *Abies sibirica*, always unstable and burning badly, is no exception this year, most plants being killed. *Abies umbellata*, of Japan, is reliable, coming through the winter without a blemish. This species is intermediate between *A. homolepis* and *A. firma*, our plants resembling very much the former and are perhaps a form of it. *Abies Veitchii*, also of Japan, is fine, whether in groups or in exposed situations.

The spruces, *Picea*, occupy a place in the pinetum near the firs, the slope being more to the north. The following species are in the pinetum: *Picea Abies* (*P. excelsa*), *P. ajanensis*, *P. canadensis* (*P. alba*), *P. Engelmannii*, *P. Mariana* (*P. brevifolia*), *P. Maximowiczii*, *P. obovata*, *P. Omorika*, *P. orientalis*, *P polita*, *P. pungens* and var. *glauca*, and *P. rubens*. Of these the tiger-tail spruce, *P. polita*, and the Colorado blue spruce, *P. pungens*, and its variety *glauca*, stood out conspicuously on account of their hardiness. They came through the winter unharmed. *P. Engelmannii*, while an excellent conifer for this latitude, is not quite as hardy as *P. pungens*, nor does it present the sturdy vigorous habit of that species. *P. obovata* is apparently a little hardier than *P. Abies*. *P. Maximowiczii* and *P. canadensis* have proved satisfactory. *P. Abies*, *P. ajanensis*, *P. Omorika*, and *P. orientalis* indicated dissatisfaction by dropping part of their leaves. In most cases this damage will be repaired by the development of the leaf-buds, but some plants of *P. orientalis* and *P. Abies* were so badly damaged that their recovery is impossible.

The genus *Chamaecyparis*, including also *Retinispora*, has proved very unstable. The American forms of this in cultivation here are: *C. Lawsoniana* and its variety *Alumi*, *C. Nootkatensis*

and *C. thyoides* and its variety *Andelyensis*, the latter species from the east, the others from the northwest. *C. Lawsoniana*, even in most sheltered and favorable positions, was badly burned, and in more exposed situations practically killed. The variety *Alumi* is considerably hardier, burning on the tips only. *C. Nootkatensis* in groups or in sheltered places came through the winter in good condition, burning some in more exposed situations. The white cedar, *C. thyoides*, was badly burned in a sheltered situation, some of the plants being killed. Its variety *Andelyensis* was also badly burned and killed.

The Japanese section of the genus, known commonly as *Retinispora*, has proved very unsatisfactory. *C. obtusa* and its varieties, which heretofore have stood well, met with disaster, excepting in sheltered places. The golden forms seem to be hardier than the green ones, excepting the varieties *filicoides* and *lycopodioides* which have stood equally well. *C. pisifera* and its varieties, excepting in well-sheltered places, or in groups, were badly damaged, the entire tops in some cases being killed. The variety *plumosa sulphurea* is exceptional in its hardiness, coming through in good condition. The varieties *squarrosa* and *squarrosa Veitchii* burned badly, excepting when in groups or in very sheltered places.

Thuya, with the single exception of *T. japonica*, was as unstable as *Chamaecyparis*, burning badly excepting in sheltered situations. *T occidentalis* and *T. orientalis*, and their varieties, are not to be relied upon, excepting where protection may be afforded. The single exception in this genus, standing out markedly on account of its hardiness, is *T. japonica*, often found in nurseries under the name of *T. Standishii*, or *Thujopsis Standishii*. This kept its rich deep green foliage throughout, barely killing on the very ends of the branches in some individual cases. It has been under observation here at the Garden for a number of years, and has always proved satisfactory.

Two species of *Cedrus*, one represented by two varieties, are in the pinetum. They are located in a somewhat sheltered place on the ridge near the economic garden. These are the varieties *glauca* and *aurea* of *C. atlantica*, and *C. Deodara*. *C.*

atlantica glauca has hitherto kept its beautiful blue foliage intact throughout the year, but this winter its needles have burned badly, finally dropping almost entirely. The leaf-buds, however, were not harmed, and the development of these soon brought the plants back to their normal beauty. The same is true of *C. atlantica aurea*, which, however, is never so attractive as the other variety. *C. Deodara* also dropped its leaves, but these leaves are replaced by the developing leaf-buds, and the plant is again attractive with its beautiful gray-green foliage. In the severe winter of about ten years ago this species was killed to the snow line.

Cephalotaxus is never a decorative possibility in this latitude, and the three species growing here, *C. drupacea*, *C. Fortunei*, and *C. pedunculata fastigiata*, present their usual spring appearance. Of the two plants of the first named, one is badly burned, the other nearly killed. *C. Fortunei* had the tips of the leaves browned and killed, while the remaining species was badly burned and the tips of the branches destroyed.

The Japanese cedar, *Cryptomeria japonica*, was one of the surprises of the winter. This is usually considered unstable in this latitude, but a number of plants, including one tall one which has been there for several years, have come through the ordeal in excellent condition. In among these is a plant of *Sequoia gigantea*, about two feet tall. This was planted late in the spring of 1911. Last winter was certainly a severe test, but it came through in fair condition. The main branches are living, the tips only being killed.

Of the yews, *Taxus*, two stand out in bold relief on account of their hardiness. These are *T. cuspidata* and its variety *nana* (usually known as variety *brevifolia*), from Japan, and the American yew, *T. canadensis*. In the pinetum the yew collection is located on the easterly side of the ridge near the morphological garden, a rather sheltered position. But even here the forms of the English yew, *T. baccata*, burned. *T. cuspidata*, and especially its variety *nana*, and *T. canadensis* remained unharmed. The most rigorous winters have failed to affect the Japanese yew, its deep dark-green foliage remaining throughout the year, making of it one of the best evergreens.

Tumion nuciferum (*Torreya nucifera*), a Japanese evergreen, in plants 3–5 feet tall, came through without a blemish. They are in the immediate vicinity of the yews.

Some of the dwarf forms of the American hemlock, *Tsuga canadensis*, were killed, but what is known as Sargent's hemlock, *Tsuga canadensis pendula*, has proved entirely hardy, even in exposed situations.

The pines, *Pinus*, have proved the most satisfactory coniferous evergreens for exposed or dry situations. These, with few exceptions, have come through without damage. A single plant of the loblolly pine, *Pinus Taeda*, which had managed to survive several previous winters, was unable to stand the extraordinary conditions of the past winter. Plants of *Pinus resinosa* in an exposed situation on the top of a hill were badly burned or killed, while those in the lee of the hill were unharmed. *Pinus Sabiniana* and *P. contorta* had the ends of the leaves burned. The other pines, not including the white pines, under cultivation here, all satisfactory, are: *P. austriaca*, *P. Banksiana*, *P. densiflora* and variety *nana*, *P. montana Mughus*, *P. Pallasiana*, *P. ponderosa*, *P. pungens*, *P. rigida*, *P. sylvestris*, and *P. Thunbergii*. *P. austriaca*, *P. Pallasiana*, and *P Thunbergii* are especially decorative, the first two for their dense symmetrical growth, and the last for the odd curving of the trunk to be seen in some of the specimens.

The white pines under cultivation are: *P. Strobus*, *P. excelsa*, *P. koraiensis*, *P. monticola*, *P. Peuce*, *P. Cembra*, and *P. parviflora*. None of these was seriously damaged. *P. excelsa* and some individuals of *P. Strobus* had the tips of the leaves burned somewhat. This was also true of the leaves of *P. koraiensis* in exposed situations. The others proved entirely hardy, *P. Peuce* and *P. Cembra* being especially attractive in their dark green foliage and compact habit.

Among the cedars, *Juniperus*, *J. rigida* has shown itself unstable, the plants being badly burned or killed. *J. communis* and its variety *hibernica* are never satisfactory, and this winter have proved themselves especially unworthy. *J. Sabina* and *J. horizontalis* (*J. prostrata*) have been partly killed, but not beyond

repair. *J. virginiana glauca* is excellent, its blue foliage making it most attractive. It is also less subject to that pest of the red cedar, red spider. All the forms of *J. virginiana* and *J. chinensis* have proved satisfactory; *J. chinensis Pfitzeriana* is of exceptional merit. It much resembles in habit *J. Sabina*, but is much hardier and a stronger grower than that species.

The Douglas spruce, *Pseudotsuga mucronata*, is to be commended in every way for this climate. Its rich green foliage has not been marred in the least. It stands drought well and it is one of the best all round conifers.

Among the broad-leaved evergreens grown at the Garden the rhododendrons have suffered least. *R. maximum* and *R. catawbiense*, even in exposed situations, have come through remarkably well. There has been some burning of the foliage and some few plants have been killed back, but, considering the destruction so prevalent among other evergreens, these have escaped any serious damage. *R. catawbiense* is much to be preferred for open exposed situations.

The Japanese holly, *Ilex crenata*, after going through many winters without a blemish, received considerable damage the past winter, in some situations. This damage was in the shape of the burning of the foliage and killing back of the younger branches, the effect rarely extending to the older wood. Some of the plants have come through almost intact, while others nearby, with apparently the same conditions to contend with, were severely burned. Certain plants have in some cases had individual branches killed, while other branches have kept their leaves green. This has not been due to exposure alone, for plants in wind-swept situations, such as the fruticetum, have presented a better appearance than some others which were much better protected. None of the plants have been killed. Vigorous new growth is making its appearance, and soon the plants will be as attractive as ever. It is the best broad-leaved evergreen we have for this climate, and because the unusual severity of the past winter did some damage to it, need not prevent its use in the future, for a similar winter may not occur again for years.

From the experiences of the past winter, certain evergreens

stand out prominently as especially adapted to this climate, and capable of withstanding very trying conditions. Those which occupy the first place, not having been affected in the least, are: *Abies homolepis*, *A. umbellata*, and *A. Veitchii; Picea pungens* and its varieties, *P. polita*, *P. Engelmannii; Thuya japonica; Taxus cuspidata* and the variety *nana; Tsuga canadensis pendula; Pinus austriaca*, *P Banksiana*, *P. montana Mughus*, *P. Pallasiana*, *P. pungens*, *P. sylvestris*, *P. Thunbergii*, *P Peuce*, and *P. Cembra; Juniperus virginiana*, especially the variety *glauca*, *J. chinensis* and its varieties, especially *Pfitzeriana;* and *Pseudotsuga mucronata.*

In addition to the above, the following, among others, were somewhat harmed, but in ordinary winters are satisfactory, and well worth growing: *Abies cephalonica*, *A. nobilis*, *A. cilicica*, *A. concolor*, *A. Nordmanniana; Picea orientalis*, *P. canadensis*, and *P. Omorika; Chamaecyparis obtusa; Cedrus atlantica glauca; Pinus Strobus*, *P. koraiensis*, and *P. excelsa; Juniperus Sabina*, and *J. horizontalis*, *Rhododendron maximum*, and *R. catawbiense ; Ilex crenata.*

It is difficult to explain just what caused this great fatality in evergreens during the winter of 1911–12. A study of the following tables, compiled from the records of the Garden, may throw some light on the subject.

It will be seen from the following table of temperatures that the unusually cold weather of last winter occurred between January 5 and February 13. Early January 5 the temperature began to drop, reaching a minimum of 5° on the 7th, remaining for 46 consecutive hours of this time below 10°. On the following week, terminating with the 14th, the temperature did not rise above the freezing point but once, on the 9th, remaining for five consecutive days below 20°, and two of these below 10°, with the lowest record of the winter, — 6°, on the 13th. For the week of January 15 records above the freezing point occurred at midday on four occasions, with a minimum of 3° on the 16th. For the following week, beginning with the 22d, only once was a temperature above freezing recorded, on the 23d, most of the remaining portion of the week being below 20°. The week of January

Temperatures.

1910–1911, Week of	1911–1912, Week of	Maximum.	Minimum.	Number Days 32° or Below.
Nov. 7		62	29	3
	Nov. 6	67	28	1
14		54	21	2
	13	56	24	2
21		60	29	1
	20	50	21	5
28		41	22	4
	27	57	23	4
Dec. 5		41	9	7
	Dec. 4	60	10.5	6
12		45	7	7
	11	65	27	1
19		43	12	5
	18	52	21	3
26		52	12	5
	25	52	22	5
Jan. 2		53	11	5
	Jan. 1	42	5	7
9		47	25	1
	8	42	−6	7
16		46	11	4
	15	49	3	7
23		52	16	3
	22	53	5.5	7
30		47	12	6
	29	41	10	7
Feb. 6		51	15	7
	Feb. 5	29	0	7
13		45	9	4
	12	48	7	6
20		57	11.5	6
	19	62	21	3
27		53	19	4
	26	42	14	5
Mar. 6		57.5	16	5
	Mar. 4	47	15	5
13		56.5	15.5	4
	11	57	21	1
20		70	17	3
	18	63	19	3
27		55.5	24	3
	25	68	19	1
Apr. 3		69	27.5	2
	Apr. 1	80	25	1
10		60	29	3
	8	61	28	1
17		61	31	2
	15	75	35	0
24		85	37.5	0
	22	70	36	0

PRECIPITATION.

	1910	1911		1910	1911
Jan.	6.38	1.72	July	0.64	1.96
Feb.	3.86	3.66	Aug.	1.17	6.50
Mar.	1.04	3.67	Sept.	1.35	1.55
Apr.	4.39	3.15	Oct.	2.38	4.95
May	2.22	1.31	Nov.	2.83	4.52
June	4.84	4.94	Dec.	2.46	4.09
				33.56	42.02

29 was ushered in with a temperature of 20°, remaining continuously below the freezing point until February 2, the end of this week recording a minimum of 10°. The week beginning February 5 again recorded a temperature way below freezing, rising above that point only on two or three occasions during the middle of the day, with a minimum of 0° on the 10th, again ascending above the freezing point on the 13th. This terminated the long cold period of the winter. During this period of forty days, temperatures above the freezing point were recorded on about fifteen days, these higher temperatures occurring mainly during midday. No such protracted cold spell is recorded for the winter of 1910–11, the minimum for that winter being 7°, or 13° higher than the minimum for the winter of 1911–12.

A comparison of the precipitation for 1910 and 1911 shown in the above table of precipitation gives some interesting results. In 1910 a protracted drought during July, August and September, when only 3.16 inches of rain fell, was followed during October and November by a moderate precipitation, the two months totaling 5.21 inches. This moderate precipitation, after the extended drought, was readily and rapidly absorbed by the soil. In other words, woody plants were not made "sappy" by an overabundance of water, the wood ripening up well. In 1911 the precipitation during September was only 1.55 inches. This dry spell was followed during October and November by a heavy rainfall, totaling 9.47 inches, almost twice the precipitation for the same period the previous year. This abundance of water would have a tendency to make wood soft, to retard its proper ripening, a condition not at all favorable for withstanding the unusually severe cold of the following January and February.

Whatever effect it is that the cold has upon evergreens, the damage is not apparent until the winds of late March and early April come. Then plants, which up to that time have appeared green and in good condition, turn to a deadly brown within a few days, and the damage which has been done is startlingly revealed.

The unusual conditions which seem to stand out in the past winter are two: first, the excessive rainfall during October and November, following a dry period when the plants were inactive; and second, the unusual cold of the following January and February. Neither one of these in itself would, perhaps, have been disastrous, but the combination of the two was destructive.

GEORGE V. NASH.

NOTES, NEWS AND COMMENT.

Dr. George G. Hedgcock, of the Bureau of Plant Industry of the United States Department of Agriculture, spent two days at the Garden in June, examining the collections of parasitic fungi.

Dr. Howard J. Banker, professor of biology in De Pauw University, Indiana, spent a week at the Garden in June and also in July, studying the collections of Hydnaceae.

Professor Francis E. Lloyd, who has formerly spent considerable time at the Garden and who was recently professor of botany in the Alabama Polytechnic Institute and plant physiologist to the Alabama Experiment Station, has been appointed Macdonald professor of botany in McGill University, Montreal, Canada.

Dr. Edgar W. Olive, professor of botany in the State College of South Dakota, has been appointed curator in the Brooklyn Botanic Garden.

Dr. W. C. Coker, professor of botany in the State University of North Carolina, spent several days at the Garden in July, continuing his studies of the flora of North Carolina.

Dr. Geo. M. Reed, professor of botany in the State University of Missouri, has charge of the botanical work in New York University during the summer term.

Meteorology for June.—The total precipitation recorded for the month was 1.05 inches. Maximum temperatures were recorded of 87° on the 1st, 3d, and 11th; 91° on the 17th; 96° on the 29th. Also minimum temperatures were recorded of 41° on the 8th, 42° on the 14th, and 53° on the 19th.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

7 specimens of flowering plants and ferns from Kiruna, Swedish Lapland. (Given by Professor J. F. Kemp, for the Columbia University Herbarium.)

23 specimens of mosses from Gate, Washington. (By exchange with Mr. A. S. Foster.)

1 specimen of *Juncoides bulbosum* from New Jersey. (Given by Mr. Bayard Long.)

120 specimens of rare plants from California. (By exchange with the University of California.)

27 specimens "North American Musci Pleurocarpi. (Distributed by Dr. A. J. Grout.)

1 specimen of *Waldsteinia lobata* from South Carolina. (By exchange with Mr. W. W. Ashe.)

8 specimens of the flowering branches of black-ebony from Andros, Bahamas, West Indies. (Given by Hon. George H. Clarke.)

2 specimens of flowering plants from Florida. (By exchange with Mr. Herbert R. Mills.)

1 specimen of *Georgia pellucida* from the New York Botanical Garden. (Given by Mrs. N. L. Britton.)

2 specimens of mosses from California. (Given by Mrs. W. A. Murrill.)

281 specimens mostly from Cuba. (By exchange with the United States National Museum.)

25 specimens "Lichenes Suecici Exsiccati," fascicle X. (Distributed by Professor G. O. A. Malme.)

2 specimens of mosses from Hannibal, Missouri. (Given by Rev. John Davis.)

5 specimens of mosses from Nova Scotia. (Given by Dr. C. B. Robinson.)

2 specimens of mosses from Alaska. (Given by Dr. R. Heber Howe, Jr.)

19 specimens of fungi. (By exchange with Dr. Charles E. Fairman.)

1 specimen of *Ascobolus* (type). (By exchange with Dr. B. O. Dodge.)

100 specimens "North American Uredinales," century 5. (Distributed by Mr. Elam Bartholomew.)

100 specimens "Fungi Columbiani," century 37. (Distributed by Mr. Elam Bartholomew.)

29 specimens of fungi from North Dakota. (Given by Mr. Fred J. Seaver.)

2 specimens and 3 photos of gill-fungi from Porto Rico. (By exchange with Mr. J. R. Johnston.)

57 specimens of fungi from the United States. (By exchange with Dr. G. G. Hedgecock and Professor W. H. Long.)

8 specimens of fungi from New York and North Carolina. (By exchange with Dr. H. D. House.)

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EDITOR

FRED J. SEAVER

Curator

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WILD COLUMBINE.

JOURNAL

OF

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WILD PLANTS NEEDING PROTECTION.[1]

4. "WILD COLUMBINE" (*Aquilegia canadensis* L.).

(WITH PLATE XCVIII.)

Nodding in the cool winds of spring-time, and so lightly poised on its slender stems, that it is almost impossible to take its photograph, the wild columbine adorns the rocks and ledges in May with its gay, red and yellow blossoms and occasionally is found in fields at middle elevations where it blooms until July. The flowers are pendent, about 1–2 inches long, bright red, the five short red sepals overlapping five tubular spurs which terminate below in thickened honey-sacs and broaden out above into five short yellow petals attached around a long-exserted, cluster of slender yellow stamens, about fifty in number. These are attached in five rows to a disc at the base of the ovaries, which are five in number and hairy with five long slender styles; they develop into five follicles with long spreading points. Each follicle contains about fifteen shining black seeds attached along the ventral suture.

The basal leaves are pale green beneath, three-parted and each leaflet again divided into three, toothed lobes; smaller, short-stalked, simpler leaves also grow on the flower stalks and diminish into bracts above. The stems vary in height from one to two feet and are smooth or slightly hairy above. The root is fibrous and easily uprooted and for this reason the plant largely depends on its seeds for reproduction and is likely to be quickly exter-

[1] Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

minated on account of its showy flowers. Occasionally plants are found with pale yellow blossoms growing among the normal ones.

It ranges from Nova Scotia to Northwest Territory south to Florida and Texas and ascends to high altitudes in the Alleghanies and the Rocky Mountains.

It was first described and figured by Cornuti in 1635 and was called *Aquilegia canadensis* by Linnaeus in 1753. The generic name refers to a fancied resemblance of the spurs to the talons of an eagle; on this account and the wide range of the genus throughout the United States, it has been strenuously advocated for the honor of being called the national flower. About fifteen species of *Aquilegia* are known from the United States, ranging through the Rocky Mountains into Mexico and the western states; all have showy flowers varying from white to yellow and blue, and are greatly prized in cultivation.

This genus belongs to the crowfoot family, *Ranunculaceae*, of which about thirty-five genera and one thousand and fifty species are distributed throughout the temperate regions of the world.

ELIZABETH G. BRITTON.

DEVELOPMENT OF THE PATH SYSTEM OF THE GARDEN.

The construction of paths through the Garden reservation provided for by the general plan approved in 1897 has proceeded parallel with the grading, drainage and planting of the grounds, and little modification has been made in the positions selected for paths at that time, the only essential modification of the general plan having been the addition of certain paths which have been found necessary. At the present time, about four-fifths of the path system as planned in 1897 has been constructed and opened to the public, and the Telford foundation of some 3,000 feet more has been laid, ready for final surfacing. The total length of paths contemplated by the original general plan still remaining entirely unconstructed is about 2,000 feet. Ad-

ditional plans approved, but not yet carried out, call for about 1,000 feet. The desirability of still further elaborating the path system at places, in order to lead visitors more closely to parts of the collections, is apparent, and this is now under study. It was early determined that the lines of travel through the natural woodlands should be trails rather than constructed paths, and a large portion of these have been provided with low railings, found necessary to prevent the increasing number of visitors from trampling the undergrowth and damaging the trunks and roots of trees. An appropriation for continuing this railing of trails has been asked from the city.

Paths completed and opened thus far in 1912 include one from the flower gardens at conservatory range no. 1 through the pinetum to the path on the southern side of the driveway in front of the museum building; a path from the temporary wooden chestnut bridge over the Bronx River at the southern end of the north meadows, running northward along the river to the Upper Bridge in the north end of the grounds, and a path from the east end of the Long Bridge over the Bronx River, running northward along the river and through the north meadows to the Newell Avenue entrance at Williamsbridge, together with several short connections between these paths and others already constructed, making a total path length 10 feet in width of 3,750 feet thus far completed in 1912, and it is expected to complete and open at least 1,000 feet more during the remainder of the year.

The most difficult of this construction, and that which has required the most time and closest attention, is the path along the east side of the Bronx River northward from the Long Bridge, where a rough stone wall had to be constructed for some 500 feet immediately on the edge of the river to carry this path, which has been provided with a high railing as a precaution against visitors slipping into the stream; it was well worth the time and work required, however, for it is one of the most attractive paths to be found anywhere in the Park System, and its completion now enables visitors to walk either immediately along or within sight of the river practically all the way from Williamsbridge to Pelham Avenue, passing out of the Garden reservation to the south just north of the Lorillard Mansion.

The Telford foundation of the entire path system has been built from stone obtained through necessary grading operations within the grounds, and sufficient is retained in the remains of the rock hill behind the museum building to construct the uncompleted portions.

N. L. Britton.

A FUNGOUS INFECTION OF THE EAR.

The disease known as mycosis of the external ear of man is not uncommon. Cooke* describes as a new species, *Aspergillus nigricans*, which had been obtained from the human ear. Later he† again describes and also gives figures of this mould.

General descriptions of cases of mycosis of the external ear have appeared in various medical journals and books. One of the more recent of these is by the noted specialist Ballenger‡, whose discussion may be here summarized as follows: The fungus forms a membrane black or grayish in color and velvety in texture which covers the osseous portions of the canal, although the drum head and cartilaginous portions of the canal may also be covered. If the epidermis alone is affected there may be no symptoms. If the true skin is attacked there is swelling and inflammation with pains, itching and deafness. The mycelium may extend to the middle ear or even to the mastoid cells.

The source of the infection is unknown. It is noted, however, that the disease is quite common among bakers and among the poor who are living in unsanitary conditions. It is stated that various species of fungi have been found growing in the ear, but the most common species are *Aspergillus niger*, *A. flavus* and *A. fumigatus*.

In the treatment, a long list of antiseptic mixtures and powders have been used without general success. In fact, the fungus appears to thrive in spite of treatment with the ordinary solutions

* M. C. Cooke. New British Fungi. Grevillea 6: 1878.

† Some Remarkable Moulds. The Journal of the Quekett Microscopical Club, II., 2: 140 and Plate I. 1885.

‡ W. L. Ballenger. Diseases of the nose, throat and ear. 1911.

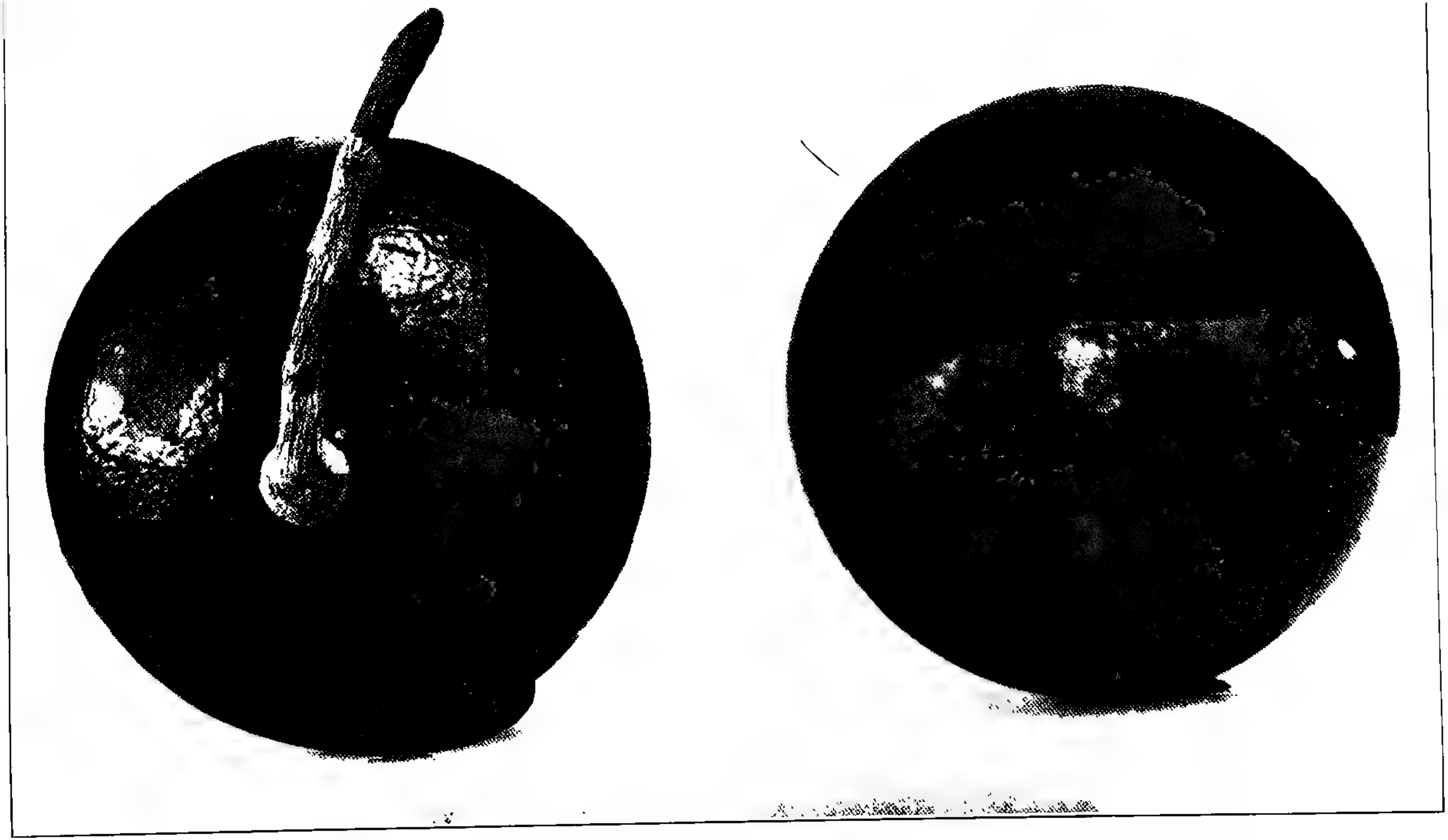

FIG. 1. Fruits of the Kaffir orange (*Strychnos spinosa*), about three-fourths natural size.

of carbolic acid, boric acid and mercury bichloride. Alcohol is, however, an effective remedy, and when dropped in the ear once or twice daily for about four days it effects a complete cure.

A case of infection of the ear by *Aspergillus nigricans* Cooke has recently been brought to the attention of the writer. In this case there has been also repeated infections with *Micrococcus*, resulting in small abscesses. Several physicians and ear specialists consulted from time to time were led by this condition to overlook the presence of the fungus which was evidently of primary importance. The treatment with mercury bichloride (1 : 1,000) checked the infections due to the micrococci, but the fungus continued to develop, at times almost filling the ear cavity with mycelium and producing an abundance of spores. In this condition it was easily isolated in pure cultures. At present report the treatment with alcohol appears to have entirely removed the infection from the ear.

A. B. Stout.

THE KAFFIR ORANGE.

(With Fig. 1.)

Reports and records of edible fruits of *Strychnos* or fruits closely related to those of strychnine and nux-vomica plants, have been current for many years. They, however, have often been seriously doubted.

In the spring of 1903, Dr. David Fairchild introduced plants of a species of *Strychnos* from Portugese East Africa, into the Subtropical Garden of the United States Department of Agriculture at Miami, Florida. These plants are said to represent the species *Strychnos spinosa*. This plant is native of a large part of Africa lying south of the desert region. At Miami it is a spine-armed shrub of slow growth, especially in its younger stage, with a rambling habit, more or less drooping, very slender branchlets, small leaves, and very small, as well as inconspicuous, clustered flowers. The size of the branches, the leaves, and the flowers are each and all out of proportion to the size and the weight of the fruits. These are globular, and superficially they

resemble an orange, even to the external coloring, whence, in connection with its geographical range, the name "Kaffir orange." The fruits vary from three to four inches in diameter and weigh between one and two pounds each. However, the likeness to an orange ceases with the outside of the rind. This cannot be removed with the fingers or with a knife, as in the case of an orange, but a hammer or some similar instrument is needed to get at the pulp within the "Kaffir orange." The rind is about an eighth of an inch in thickness, hard and somewhat brittle. Within, the fully ripe pulp is of different shades of red or pink. It is sweet, and in flavor it suggests that of a good canteloupe. Unlike an orange, too, the seeds of the "Kaffir orange" are poisonous, so that in eating the pulp in which the seeds are imbedded, great care must be exercised to eliminate all the seeds. The seeds closely resemble those of the related nux-vomica plant, and they are rendered especially easy to swallow by a slimy-hairy coat which envelopes each of them.

The accompanying figure representing the two specimens of "Kaffir orange" received at the Garden through the kindness of Mr. Edward Simmonds, Gardener of the Subtropical Garden of the United States Department of Agriculture at Miami, Florida, is as far as we know the first illustration of this interesting edible fruit. The fruits as they appear in the figure are about three-fourths natural size.

JOHN K. SMALL.

AUTUMN LECTURES, 1912.

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

Sept. 14. "Experiments in Mutation," by Prof. Hugo de Vries.

Sept. 21. "Exploring the Pacific Coast—IV. California," by Dr. W. A. Murrill.

Sept. 28. "The Upper Delaware Valley and Its Flora," by Mr. G. V. Nash.

Oct. 5. "Botanizing in the Yellowstone National Park," by Dr. P. A. Rydberg.

Oct. 12. "Insect Galls Injurious to Vegetation," by Dr. E. B. Southwick.

Oct. 19. "Some Microscopic Water Plants," by Dr. M. A. Howe.

Oct. 26. "The Chemical Production of Albuminous Matters in Plants," by Prof. W. J. Gies.

Nov. 2. "Exploring the Pacific Coast—V. California to New York," by Dr. W. A. Murrill.

Nov. 9. "Horticulture in the Northwest," by Mr. G. V. Nash.

Nov. 16. "The Forests of the Amazon," by Dr. H. H. Rusby.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. The doors will be closed at 4:05, and opened again at 4:15 to admit those arriving late.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

NOTES, NEWS, AND COMMENT.

Dr. A. B. Stout, director of the laboratories, recently spent several days at Woods Hole, Massachusetts.

Professor Charles E. Bessey, of Nebraska State University, visited the Garden in July and spent several days looking over the collections and experimental work.

Dr. David R. Sumstine spent a week at the Garden in July investigating certain groups of the lower fungi.

Professor J. B. Overton, of the University of Wisconsin, was a visitor at the Garden on July 27, on his return from a three weeks' visit at Woods Hole.

Dr. W. A. Murrill, assistant director, spent two weeks the latter part of July in the Adirondack Mountains collecting fleshy fungi.

Professor C. E. Seashore, dean of the graduate college of the State University of Iowa and teacher of psychology in Columbia University during the summer term, visited the Garden on July 27.

Mr. L. O. Overholts, of the department of botany of Miami University, Oxford, Ohio, has been granted a research scholarship during August and September. He will devote his attention to the preparation of a list of the Polyporaceae of Ohio, with full keys to the genera and species.

Professor W. G. Stover, of the Oklahoma Agricultural Experiment Station, has been appointed assistant professor of botany in Ohio State University for the coming year. Mr. Stover is a graduate of Miami University and was at one time a student at the Garden.

Mr. P. J. Anderson, field pathologist of the Pennsylvania Chestnut Tree Blight Commission, and Professor H. W. Anderson, investigator for this Commission, visited the Garden August 14 to examine herbarium specimens and literature of fungi relating to the chestnut blight.

Professor John Craig, head of the department of horticulture at Cornell University and well known throughout the country for his publications on this subject, died at Siasconsett, Massachusetts, August 12, aged 48 years. Professor Craig attended the floral exhibit at the Garden on May 25 and was much interested in the large display of lilacs from Mr. Havemeyer's collection at Glen Head, Long Island. At that time, he arranged to present to the Garden a full set of duplicates from his very complete collection of peonies, on which a series of his studies extending over several years has been based.

Professor J. J. Thornber, of the University of Arizona, spent two days at the Garden in July looking over the collections of certain groups of the flowering plants. Professor Thornber is just returning from a year's study in the National Museum at Washington.

The large amount of damage to the foliage of oak trees by oak leaf-miners has been brought to the attention of the Garden.

This insect causes large blister-like spots on the leaves of different oaks, these spots, which sometimes cover a large portion of the leaf, turning brown and injuring and disfiguring the foliage of the entire tree. The blisters are caused by small larvae which work under the epidermis of the leaf and are thus protected against the ordinary treatment by spraying. The insect hibernates in the old leaves and one of the means of control which has been recommended is to gather these leaves and burn them, thus preventing further infection.

In the Gardener's Chronicle for 1911, G. Webb describes a successful treatment of hollyhocks against attacks of the rust (*Puccinia malvacearum*) by the application of a powder which consists of 1 bu. of slaked lime, 1 bu. of soot, 4 lbs. of flowers of sulphur, and 2 oz. of finely powdered sulphate of copper. This mixture should be passed through a fine sieve and the plants dusted with the powder three or four times during the growing season, in the morning while the dew is still upon them.

Metereology for July.—The total precipitation recorded for the month was 2.84 inches. Maximum temperatures were recorded of 92° on the 4th, 100° on the 9th, 90° on the 12th, 88° on the 18th, and 89° on the 28th. Also minimum temperatures were recorded of 48° on the 1st, 62° on the 15th, and 53° on the 20th and 25th.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

3 specimens of *Dicranum* from Connecticut. (By exchange with Dr. George E. Nichols.)

1 specimen of *Cypripedium reginae* from Massachusetts. (Given by Mrs. N. L. Britton.)

1 specimen of *Dicranella heteromalla* from England. (By exchange with Mr. H. N. Dixon.)

234 specimens of grasses from the western United States. (By exchange with the Bureau of Plant Industry, Washington, D. C.)

53 specimens from Anguilla, West Indies. (By exchange with the Botanical Garden, Utrecht, Holland.)

3 specimens of lichens from Washington. (By exchange with Mr. A. S. Foster.)

218 specimens of flowering plants from the western United States. (By exchange with the United States National Museum.)

4 specimens of mosses from Missouri. (Given by Mr. B. F. Bush.)

1 specimen of moss from Pinar del Rio, Cuba. (By exchange with Dr. Eugenio Cuesta.)

5 specimens of mosses from British Columbia. (By exchange with the United States National Museum.)

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Vol. 7, part 1, 1906; part 2, 1907. part 3, 1912. Ustilaginaceae—Aecidiaceae (pars).

Vol. 9, parts 1 and 2, 1907; part 3, 1910. Polyporaceae—Agaricaceae (pars). (Parts 1 and 2 no longer sold separately.)

Vol. 16, part 1, 1909. Ophioglossaceae—Cyatheaceae (pars).

Vol. 17, part 1, 1909. Typhaceae—Poaceae (pars).

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EDITOR

FRED J. SEAVER

Curator

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WILD PLANTS NEEDING PROTECTION.[1]

5. "BIRD'S-FOOT VIOLET" (*Viola pedata* L.).

After the spring is well advanced, and most of the other violets have been in bloom for nearly two weeks, the bird-foot violet comes to show how lovely a violet can be! Its flowers are larger and more delicate in color than any other of our wild species, the petals spread with a jaunty air, like a pansy, and vary in color from deep violet to pale lavender or white. They stand above the leaves on long stout pedicels and when growing in masses, as they used to on the Hempstead Plains of Long Island and Todt Hill on Staten Island, are as showy as any of the Alpine violets of Europe, comparing favorably with the long-spurred pansy of the Alps, *Viola calcarata*.

The leaves give the plant its specific and common name from a fancied resemblance to a bird's foot. They are palmately divided almost to the base, into narrow segments which are entire, or again divided into 3–5 wedge-shaped subdivisions. There is great variability in the shape and size of the leaves and they also vary from nearly smooth to quite hairy. The rootstocks are erect and stout, scaly above, and bear a large number of leaves and flowers on each, so that the temptation is to pull up the whole plant at once. When growing luxuriantly, they sometimes reach a foot in height with a dozen or more flowers open at once. The leaf-stalks and pedicels are tinted with purple and vary from 2 to 6 inches or more in length. The two upper petals are bent backward over the short spur, the two lateral ones are spreading

[1] Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

and the lower is broader and keeled, paler and veined with dark purple stripes, the base projecting to form a spur, in which a fragrant honey is found. The stamens are five, the two lower ones spurred, and all bear an orange-colored prolongation beyond the anthers, which project and surround the green club-shaped stigma, with a very small central stigmatic surface. The ovary is superior, one-called, three-angled, three-parted when ripe and bears the seeds in three rows on the walls. The five sepals also are unequal, thickened at base and auricled. The peculiar structure of the stamens and the fact that two of them have claws extending down into the honey-bearing spur are evidently aids in the fertilization by insects, and many of the violets are known to hybridize.

Viola pedata was named by Linnaeus in 1753 in his Species Plantarum but it was first described and figured by Plukenet in 1691 as "*Viola virginiana tricolor*, foliis multifidis, cauliculo aphylla." In the vicinity of Washington, D. C., and Harrisburg, Pennsylvania, the form known as *bicolor*, in which the two upper petals are dark purple, is more common. About one hundred and fifty species of violets are known from all the temperate parts of the globe. A few occur at high altitudes in the tropics. The *Violaceae* comprise fifteen genera and three hundred species, widely distributed; some of them are trees.

ELIZABETH G. BRITTON.

BOTANICAL EXPLORATION IN PINAR DEL RIO, CUBA.*

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: Embarking from New York, Saturday, November 11, 1911, I arrived in Havana the following Wednesday and reached the quaint old town of Guane on November 17. A wind and rain-storm, which the Cubans call a "cyclone," continued for three days, causing much loss throughout the western part of the province, by destroying the young tobacco plantations and flood-

* The work here described was made possible by the liberality of Mr. Ogden Mills.

ing the valleys. The broad fertile valley of Rio Cayaguateje became a vast lake-like body of débris-covered water; the railroad was washed out and communication with the outside world cut off for over a week, consequently active field work was delayed until the 22d. Guane was made headquarters until the end of the year, during which period frequent excursions were made into the surrounding region, in which there are several distinct formations.

The palm- and pine-barrens to the northwestward are a rolling country of clay, quartz and sandstone. It is very barren except in the depressions at the head of and along the many small brooklets, the wet places and margins of which are very rich in moisture-loving plants, such as *Pinguicula*, *Utricularia*, *Drosera*, *Xyris* and some arborescent plants such as "palma cana" *Sabal* sp., "manaca" *Geonoma* sp., "cana prieta" *Paurotis* sp. As the brooklets unite into arroyos and rivers, the royal palm becomes conspicuous in the resulting rich valleys, in which small farms (vegas) are developed; these are devoted principally to the cultivation of tobacco, a very precarious crop, of which it is said that but one paying crop in five years is secured. The higher dryer portions are mostly covered by small wiry grasses and low shrubs with "cana blanca" *Copernicia* sp. as the predominating feature. On flat, higher elevations, the surface of which is usually covered by small angular pebbles of white quartz, groups of small trees of a two-leaved pine are occasionally met with. Here one also finds small plants of various genera not often seen elsewhere. Very few broad-leaved trees are to be seen and these are usually short, much contorted individuals representing very few species.

Northward and westward toward Mantua the hills become higher and rougher, shale and more quartz is seen, the pine trees are larger, often forming small forests, in which a three-leaved species occurs sparingly, and in the depressions which are not large enough for cultivation the "palma cana" is usually replaced by the "palma barrigona" *Colpothrinax Wrightii*. This often occurs in large groups composed of plants of all ages, from the young with cloth-covered trunk to the

thickly swollen middle aged plants and the less common very old plants with a long slender prolongation of the trunk above the swollen mass. An excursion across this region to Mantua was made December 28 and 29 in a "valante," the prevailing conveyance of this vicinity, which afforded an unexpectedly comfortable method of securing specimens of the plants of this section of the island.

From Mantua which, aside from the fertile lands bordering the river of the same name, is surrounded by a barren region similar to that described above, I went afoot to Arroyos on the northwest coast, crossing a low flat ridge, once a pine forest of large tall trees of the three-leaved species. At this time very few live trees were to be seen, while hundreds of leafless ones were still standing. As there were no evidences of fire, in fact the ground covering was too scant to produce heat enough to kill such large trees, I was at a loss to account for such total destruction, until my Cuban companion explained that it was due to the strong wind of a previous cyclone. Beyond this pine land the plain gradually descends. Here richer land with great groves of "palma cana" and pasture lands with thickets of taller shrubs and larger trees extend to the little seaport, which was surrounded by mangrove thickets. We stayed here long enough to get some supper, returning to Mantua during the night, thus making it possible to get an early start next morning for Guane.

The limestone sierra formation which has its southwestern termination in two large rock masses, one near each of the towns of Guane and Mendoza and bearing the name of the adjacent town, attains a height of probably less than 1,000 feet and is composed of a very hard black limestone which is very much broken and deeply fissured, with perpendicular precipices often several hundred feet high and eroded into strangely fantastic forms with very sharp apices. There are few pockets of red soil of any extent among these hills and their general aspect is barren, but much scattered vegetation, principally shrubs and small trees, secure a foothold in the rock crevices. Two very characteristic trees are common on the steep sides of these rocks, the

"palma de sierra" (*Gaussia princeps*) short and thick-stalked in its early stages but very slender in its tall, old and more prominent specimens, and "drago" (*Bombax emarginatum*) with smooth, green or yellowish-barked, much swollen trunk and sparse irregular branches; the inner bark of this tree is of considerable economic importance locally as a material for tying tobacco into bundles. It is called "majagua," but is not to be confused with the bark of *Paritium elatum*, which is known here as "majagua real" and is also used in tying the bales of tobacco, which are entirely enclosed in "yagua," the broad leaf-base of the royal palm.

Neither the Cubano nor the more active Canary Islander, who have settled here in considerable numbers, venture up into these rocky hills, consequently there are no trails and the guides usually proved are unsatisfactory, being content after a little climbing to sit on a rock and decree that further ascent is impossible. As prudence suggested the inadvisability of going alone, it was not until Christmas day, after securing the services of a big negro who laughingly remarked when I engaged him, "that he feared I could not go where he would," that the summit of Sierra de Mendoza was reached without securing, however, many varieties that had not already been collected at lower altitudes. The reward for the exertion, however, was the finding of a beautiful cactus of the genus *Mammariella*, which grew in clumps in crevices of the highest rocks. It is very similar if not identical with the species that is known to grow on the rocks about the Bay of Guantanamo, near the southeastern end of the island. The Rio los Portales which cascades its way through the northwestern base of Sierra de Guane in a narrow gorge, which, to my mind, is the most picturesquely beautiful spot it has been my good fortune to see in Cuba, offers some variation to the vegetation of this formation in its spray-covered rocks and moist banks which I believe are not found elsewhere. Two characteristic plants were noted, however, a white-flowered aster on the rocks and a fern-like aquatic clinging to the rocks underneath the swiftest currents of the many little water falls.

The valley of Rio Cayaguateje at Guane which is broad and fertile is given over to cultivation and pasture, except where occupied by shallow lagoons, the principal feature of which is an abundance of yellow water lilies, lesser quantities of a white one and a profusion of the water hyacinth (*Piaropus azurea*). They are often densely bordered with a very tall *Cyperus* and a tall thick-stemmed *Eleocharis*, the dried stalks of which under the name of "junca" are largely used in the manufacture of pack-saddles.

The fresh-water lake region lying south of Mendoza (Paso Real on old maps), from which it is separated by a flat ridge of palm- and pine-barrens, extends practically from Cortes Bay on the east to Guadiana Bay on the west. It is a very flat region, mostly white sand without any rocks, except a few small lime-stones near the shore of Laguna Los Indios. It supports a thin growth of a two-leaved species of pine, with several species of palms "cana blanca," "cana prieta," and a silvery leaved *Coccothrinax* intermingled. The royal palm is very rare, being known only near the margin of Laguna Jovero and the barrigona palm occurs sparingly eastward of Laguna Herradura. The larger pine trees have been cut and sawed into lumber by portable sawmills, one of which was in operation near Laguna Herradura at this time. In the sands beneath these arborescent species and often in the bare spots in full sunshine, many varieties of small plants both herbaceous and woody occur.

The lakes, of which there are quite a number, vary greatly in size, shape and depth and are grossly misrepresented on the old provincial map either as to size, outline, or location. They are beautiful bodies of sparkling, fresh, very pure water, as there are no streams in this area. The rainfall is filtered through the sand into these depressions. Their borders vary, some have a deposit of humus and black soil on the shore usually occupied by thickets of "cana prieta" *Paurotis* sp., extending to the water's edge and large much contorted trees of a black-fruited "icaco" (*Chryso-balanus* sp.) which forms mangrove-like borders at various points, especially on Laguna Jovero. Others are bordered with shores of pure white sand and some have sandy thickets about them,

composed principally of an almost creeping white-fruited "icaco" (*Chrysobalanus* sp.), and a species of *Myrica*. The coves of others abound in large aquatics and many of the shallow places are covered with a dense growth of a large *Eleocharis*. This region was crossed on foot for its entire north and south diameter; in fact I made collections all the way from Guane to the Caribbean coast and from La Fe on Guadiana Bay to well near the eastern side in this manner. The lakes examined were Los Indios, Jovero, Blancasales, Herradura, Bufeo, Alcatraz Grande and several lesser ones.

The swamps to the south, known as Cienaga de Ramates, were crossed on December 18 by an old roadway waist-deep in water, which is slightly brackish and of a dark brown color, but little was secured from it. It is said to abound in small islands which might well repay the inconveniences and discomforts incident to its exploration. South of this swamp is situated a large area of peculiar red sandy soil, which is thickly populated, as it is one of the most important tobacco growing districts of Cuba. Las Martinas, a quaint but cleanly town, is the center of activities. Remates, prominent on old maps, is a very small place with a few wooden or thatched houses and is now called La Cayuca. I slept in Las Martinas on the nights of December 18 and 19, the day being occupied in an examination of the flora of the region southward to the coast. This consists of a gradually rising coastal lime rock covered with a dense growth of small trees and shrubs. It is broken off abruptly forming a high coastal bluff about 100 feet above the sea. This region too is grossly misrepresented on the maps, which indicate a vast swamp. The high coast of "dog tooth" lime rock was examined to the eastward in order to take another trail back into the cultivated area. The most interesting plant seen on this trip was an upright branching cactus with bright yellow fruit, probably of the genus *Harrisia*. The return to Guane was made December 20 via a "guagua" that had been engaged to make a detour from the usual route to the camp on Laguna Jovero, in order to pick up the results of my work in the lake region.

As the above described region is quite extensive, barren and uninhabited with no guides available, its satisfactory examination would have been a difficult proposition had it not been for the opportune presence of a corps of engineers of the Cuban Irrigation Commission, who were making an exhaustive study of the region. With a letter of introduction from Prof. F. S. Earle, who had made some special studies in the region for the commission, as well as a chance acquaintance with Sr. Augusto F. Cuervo, chief engineer, in charge of the work, I secured comfortable quarters at their camp, situated on the shore of Laguna Jovero, where every comfort available in a well regulated camp was accorded me. The camp at the time was very short-handed so that a man could not be assigned to me, but access to the sketches of their various surveys and personal directions enabled me to go about the region with perfect knowledge and full confidence as to my whereabouts. It is to be hoped that the studies being made by these gentlemen will appear in published form in due time, as they would certainly be a distinct contribution to the geographical and topographical knowledge of Cuba. I here express my sincere gratitude to Mr. Cuervo and his associates for the kindness shown me during my stay with them.

January 1, 1912, I finished packing and moved to Los Palacios, where I was fortunate in securing accommodations with the family of Superintendent E. W. Halsted of the El Caimital Fruit Company, and which was made my base until February 8. On January 5, I went to Havana to arrange with Mr. Percy Wilson for the transportation of the Guane collection to New York with him, and after seeing him aboard the ship for New York returned to Los Palacios, which is surrounded by a flat region almost entirely given over to cultivation and pasture. The soil is a red clayey one underlined with a porous limonite rock and very low in iron. Small fresh-water lagoons are abundant; their muddy margins are usually grassy swamps and their surface largely covered by a yellow water lily, but none of the sand-loving plants secured in the region above described were observed. Many thickets were examined with indifferent results. The marsh lands along Rio Los Palacios, known as La Macurijes, were partly explored.

On January 10 a trip was made on foot to the home of Professor Earle, northeast of Herradura. The interesting savanna westward of Paso Real with its mixture of pine-trees and barrigona palm (*Colpothrinax Wrightii*) was crossed and many interesting plants collected. Many of them were identical with those of the lake region already described. Next morning several hours were devoted to the immediate vicinity of the Earle estate, the afternoon and a part of the night being spent on the return trip. A small stream flowing southward to the railroad proved to be a splendid collecting ground and consumed most of the afternoon. On January 17 a muleback trip was begun to the south coast passing through a level *Pinus-Copernicia* savanna. Southeast of the town frequent stops for collecting were made, especially at San Juan de Zayas. Our hammocks were swung in a Cuban hut at San Gabriel. That night and the following we drank coffee out of "guira" cups, the hard rind of the fruit of the calabash tree (*Crescentia*), and we ate rice, sweet potatoes and malangas with a spoon.

On January 18 we continued southward through mostly pastured savannas to the sandy pine lands near the coast known as Pinal de la Catalina and to the mangrove swamps at the mouth of Rio Los Palacios, returning to San Gabriel in the afternoon, where explorations were continued among the low river thickets. Next morning we crossed the river and the partly pastured, mostly savanna plain to and across Rio Caiguanabo ó San Diego, thence northward across the *Sabal* savanna in which a few scattered pine-trees occur, recrossing the last mentioned river at Santa Monica and reached El Caimital late in the afternoon.

On the 25th of January we started on mule-back for the north coast with the understanding that we were to cross the mountains in a northerly direction to Bahia Honda, but when the foot-hills were reached my "practico" said it was impossible to get through as the cyclone had destroyed the trail (everything is blamed on the cyclone in these parts). I was inclined to discharge the guide and return, but having had considerable difficulty in securing one for this trip, I concluded to make the best of it and followed westwardly along an old road to a point some distance back of

San Diego de los Banos, where we struck a trail going north. Crossing over a low shale hill forested with large trees of the Cuban live-oak, into the fertile valley of San Pablo del as Yeguas, after which by a circuitous route, crossing several sandy-clay and shale hills with good sized pine-trees and narrow intervening fertile valleys, we reached the shack of friends of the guide considerably after dark, and I learned that we were at Galalon.

Next morning as considerable of the route over which we came the previous evening was retraced, it dawned upon me that my guide who was well acquainted and evidently once a resident in the neighborhood had used this opportunity of calling on his old friends. However, quite a few plants were collected on the way. We crossed a series of steep shale and sandstone hills with a sparse growth of pines and a variety of scattered shrubbery, observing tree ferns and the "manaca" palm in the ravines. Finally we came to the fertile limestone valley San Pedro del Caimito, followed the river for some distance then crossed a low ridge to near San Jose de Sagua, at the western base of the limestone mountain Pan de Guajaibon, said to have an altitude of 2,532 feet and undoubtedly the highest point in western Cuba. From here we crossed the eastern base of Loma Cajalbarra, a flat-topped serpentine ridge nearly as high as the neighboring "Pan" and said to be about 15 miles long. Much of it is covered by a deposit of earthy red limonite which supports a rather dense forest growth of large tall pine-trees, apparently identical with the pine-trees of Oriente. This region is unlike any other in western Cuba, but resembles the iron ore region of Sierra Nipe. We came to a house just before dark where we secured food and swung our hammocks in a tobacco barn. This was at San Marcos, about two miles from La Mulata, which place I had hoped to reach that night.

Next day, however, I found that it was just as well that it had not been reached, for instead of there being a town as indicated on the map, there was only a small "tienda" (store) at which we could have fared no better. The north coast which is of soft limestone and sticky yellow soil was visited,

but nothing of note was seen or collected. From here we proceeded eastward over an old and much neglected road, crossing several small rivers, whose banks afforded some additional specimens and whose course would seem to justify further exploration as the vegetation is rich and of tropical appearance. After passing through the old town of Las Pozas, now represented by a few shacks, the picturesque ruins of an old brick church and the crumbled walls of former houses, and fording Rio San Miguel, we passed over a peculiar formation of soft stratified yellow rock that seemed to be a mixture of sand and limestone eroded into small conical hills evidently very fertile, as the royal palm grew upon their summits and sugar-cane was cultivated up the sides to the very top, but the most striking thing about them was that the tall river bank grass "cana brava" grew up the sides of these apparently dry hills. Near the roadside of this region was a large pool entirely covered by a dense growth of *Chara*.

Buenaventura, the headquarters of the Buenaventura Fruit and Land Company, was reached in the afternoon. This was used as a base by Mr. Percy Wilson about a year ago, when he made an exploration of the region about Bahia Honda, and I was well received by his friends. I remained here over night in surroundings greatly in contrast to that of the several preceding ones, and I owe to Mr. John G. Keyser and to Mr. and Mrs. Gates my sincere thanks for their attention and hospitality.

Next morning, Sunday, I started southward from Bahia Honda, wishing to reach San Diego de Tapia in the middle of the mountains early in the afternoon, and as an American concern had quarters established there, hoped to spend the remainder of the day collecting in the neighborhood, but although my practico had instructions from the folks at Buenaventura and claimed to know the way, the place was missed and we had to travel for some time after dark before coming to a Cuban home, where we stopped for the night swinging our hammocks in a granary. This was called El Rosario, of which there are many in the province, and is well south of the divide as it required but a short time next morning until we had occasional glimpses of the southern

plain. We struck the plain somewhere north of Chirigota, where we came to the Havana-Pinar del Rio macadamized road, which we followed westward through Santa Cruz de los Pinos to Los Palacios. We crossed the Taco Taco River about noon and lunched under the shade of the iron bridge. Here the river has a soft limestone bed and some collecting was done northward along its rocky course to where it becomes a deep body of quiet water in which large numbers of big fish and turtles were seen.

This trip of five days in the saddle covered a considerable stretch of country, and although many short stops were made to collect, only 150 numbers were secured, which does not indicate that the region was poor in botanical material, for it is quite the contrary, especially the well-watered fertile limestone hills south of Bahia Honda which were crossed in considérable haste and partly in the dark. However, it gave me a knowledge of the country that may be of service for future work.

The siliceous formation with its attendant pine-trees extends entirely across the island, southward in the form of a sandy plain and northward in a series of shaly hills, cutting the limestone range of mountains, which extends from Sierra de Anafe, near Guanajay on the northeast to Sierra de Mendoza on the southwest into two distinct parts. The western portion is composed of usually perpendicular sharp-pointed peaks of a hard black limestone, comparatively dry and barren of much vegetation. The eastern hills are less abrupt, compossed of a lighter colored, softer and more stratified lime rock usually well watered and covered by a rather dense forest growth, and apparently devoid of the two most striking arborescent features of the western hills, the slender "palma de sierra" and the grotesque "drago." The extensive serpentine limonite formation with its large pine forest, known as Loma Cajalbarra, is entirely distinct from the rest of the afore mentioned formations, and as it had been visited by Wright in December, 1863, it may possibly harbor some of his rare pine land plants that we have as yet failed to find. At any rate it must harbor many species not occurring elsewhere in western Cuba. Pan de Guajaibon, supposedly the highest point in the western part of the island, has a somewhat different

aspect than the limestone sierras of either of the other groups and may belong to a different formation. Wright mentions having "climbed it twice," but what its plants are really like can only be ascertained by an ascent, which is probably not as difficult as it would seem to be.

The preservation of the collections, interspersed with some short local excursions and the final packing of all accumulations, occupied the time until February 8, when I moved out to Havana, where I had to remain for several days to arrange for the shipment to New York of the Los Palacios collections. On February 11 I had the pleasure of an afternoon's excursion under the guidance of our very good friend, Brother Léon of Colegio de la Salle, Vedado, Havana, to Lomas de la Jata, near Guanabacoa, where a number of plants not heretofore secured by him were collected. We went around Havana Bay, by way of the old Havana-Regla road, on which is supposed to be the type locality of the mysterious *Cocos crispus*, and my previous opinion of its being based on plants of *Acrocomia* was confirmed by the presence near the road of several specimens of that palm.

Respectfully submitted,

J. A. SHAFER.

THE McCLATCHIE HERBARIUM.

The entire herbarium of the late Professor Alfred James McClatchie, of Throop Polytechnic Institute, Pasadena, California, has recently been purchased by the New York Botanical Garden. It contains the following specimens, many of which are valuable types:

Algae	784
Fungi	1,835
Lichens	78
Liverworts	22
Mosses	390
Ferns	67
Flowering Plants	2,630
Total	5,806

Professor McClatchie entered the University of Nebraska in

the fall of 1889, coming from Olivet College, Michigan, and received the A.B. degree the following June. Dr. Bessey states that all of his botanical work at the university was of the highest grade. Because of weak lungs, he spent most of the remainder of his life in California.

His chief publications are the "Flora of Pasadena and Vicinity," being a contribution to Reid's "History of Pasadena," printed in 1895, and the "Seedless Plants of Southern California," printed in the *Proceedings of the Southern California Academy of Science* 1: 337–398. 1897. The former work is based on collections made by himself and his wife in 1892 and 1893, the difficult specimens having been sent to Setchell, Ellis, Morgan, Peck, Underwood, Barnes, Hasse and others for determination. Duplicate specimens are to be found in the herbaria of many of these men. The total number of species and varieties of all kinds of plants listed is 1,056, of which 62 are new, although none are described in this work. The higher fungi were collected chiefly from January to June, and the leaf-inhabiting forms during the rest of the year. All of the gill-fungi pronounced edible were tested by the author personally. About fifty gill-fungi remained undetermined. An idea of the scope of the work may be obtained from the number of species listed under certain groups of fungi, as follows: Tremellaceae 3, Thelephoraceae 17, Clavariaceae 4, Hydnaceae 4, Polyporaceae 19, Boletaceae 1, Agaricaceae 74, Gasteromycetes 17.

In the later work on the seedless plants of southern California, the total number of species listed is 1,033, of which 630 are fungi, 81 bryophytes, and 33 pteridophytes. Of the 102 species of Agaricaceae, in 38 genera, 7 species are here described as new, and these are the only descriptions in the work. The Gasteromycetes are represented by 20 species in 15 genera. Other families are represented by the following number of species: Tremellaceae 5, Thelephoraceae 23, Clavariaceae 4, Hydnaceae 5, Polyporaceae 27, Boletaceae 2. In addition to specific names and generic keys, notes on the occurrence, habitat, and host plants are given in most cases.

W. A. MURRILL.

LAWNS RUINED BY THE WHITE GRUB.

The white grub has appeared in great abundance on the lawns of the New York Botanical Garden this summer, completely killing the grass in many places so that the sod may be rolled up by hand. This grub is the larval form of the June bug or May beetle, which deposits its eggs in the grass on the lawns about midsummer. The eggs soon hatch into tiny grubs which live upon the roots of the grass for the remainder of the season and also during the two succeeding seasons, when they burrow several inches into the ground, change into the pupa stage, and emerge early the following summer as mature beetles.

These grubs have been in the lawns of the Garden for several years, but they were not noticed because of the severe droughts and were not plentiful enough to entirely kill the grass. They are now so abundant that a gallon may be collected from an area seven yards long and six yards wide. We have killed great numbers of them by hand after raking off the dead sod with an ordinary garden rake, but this process is too slow and tedious for an area of several acres. A flock of starlings which lives upon the grounds of the Garden has been very diligent in destroying these grubs. In many places, the dead sod is filled with holes made by the bills of these birds in their search for the grubs. By turning up the sod with a light cultivator, we have enabled the starlings to get at the grubs more quickly. A small flock of crows has also worked with the starlings early in the morning before visitors usually arrive.

Several remedies have been suggested for the white grub, but none of them appears to be entirely effective in the presence of an epidemic like the present one. In the Middle West, where this grub is very common and very destructive, grasslands are ploughed when affected and sown in corn and other annual crops. Farmers often plough a few furrows across a field and turn in the hogs, which after once started go through the entire field after the grubs. The most effective remedy is probably to plough lightly and have a flock of chickens follow the plough. Several chemical poisons have been suggested,

but these have not been sufficiently tested as yet to make a recommendation.

We have noticed here that the white clover is not attacked by the grubs, and this observation is borne out by the observations of others in various states. We will therefore plough up portions of the lawn most badly affected and sow them in white clover as quickly as possible, about three quarts of seed to the acre, then top-dress with well-rotted manure after the ground is frozen. The white clover is hardy, thrives well on sterile or rocky soil, and makes a very fair lawn without an admixture of grass. If it is true that this clover is not attacked by the white grub, the larvae now in the ground will die for lack of food and those already in the pupa stage will emerge as mature insects and fly away, probably not depositing their eggs in the clover. After the ground is free from insects, grass seed may be sown in the clover late in the year, and it will work into the ground during the winter and germinate the following spring, resulting in the usual lawn of mixed grass and white clover.

Where lawns are not conspicuous, it might be well to grow red clover or alfalfa upon them for a time, cutting off the hay for a season or two, then ploughing and sowing the usual lawn mixture of grass. In this way, the soil would be much improved and the grubs exterminated.

W. A. MURRILL.

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NOTES, NEWS AND COMMENT.

Dr. and Mrs. N. L. Britton returned recently from a collecting trip in the Bermuda Islands.

Dr. C. B. Robinson has returned to the Philippines to continue his work on the flora of the islands. He has been assistant curator in the Garden since January.

Professor Girolamo Molon, of Milan, Italy, accompanied by Mr. Guido Rossati, of the Italian Consulate of this city, visited the Garden on August 21 to examine experiments in plant breeding now in progress.

Mr. Luther Burbank, of Santa Rosa, California, has recently sent to the Garden a dozen varieties of spineless cacti, some developed especially for forage and others for their edible fruit.

Professor Guy West Wilson, of the North Carolina Agricultural Experiment Station, has been awarded a research scholarship at the Garden for the month of September to aid him in his researches on parasitic fungi. ,Mr. Wilson will continue his work during the year as a graduate student of Columbia University.

Mr. L. R. Waldron, superintendent of the Sub-station at Dickinson, North Dakota, visited the Garden on September 14 in order to attend the lecture by Professor Hugo de Vries.

Professor M. T. Cook, of Rutgers College, New Jersey, accompanied by his assistant Mr. C. A. Schwarze, attended the lecture at the Garden on September 14.

Dr. C. Houard, maître de conferences in the Faculty of Sciences at Caen, France, visited the Garden on September 16.

Volume 17, part 2, of North American Flora was issued September 13, 1912. This part is devoted to species of grasses belonging to the family Poaceae of the order Poales. The entire part, consisting of 97 pages, is by Mr. George V. Nash.

Professor Hugo de Vries, director of the Botanical Garden at Amsterdam, Holland, visited the Garden on September 14 and delivered a lecture on "Experiments in Mutation," after which he was the guest of honor at a dinner given by Professor R. A. Harper, of Columbia University. In 1904 he first visited New York and was awarded the degree of Doctor of Science by Columbia University. At that time he delivered the dedicatory address at the Carnegie Station for Experimental Evolution at Cold Spring Harbor, gave a course of twenty-five lectures in the University of California and five lectures at the University of Chicago, and lectured at the New York Botanical Garden. He again lectured at the Garden in 1906 on his way to the University of California to deliver a second series of lectures there. The special occasion which brings him to America at this time is the opening of the Rice Industrial Institute at Houston, Texas, in October, where he will make one of the dedicatory addresses.

Meteorology for August.—The precipitation for the month was 2.54 inches. Maximum temperatures were recorded of 84° on the 6th, 94° on the 14th, 92° on the 24th and 89° on the 26th. Also minimum temperatures were recorded of 51° on the 4th, 50° on the 17th, 57° on the 22d, and 46° on the 30th.

ACCESSIONS.

Museums and Herbarium.

5,806 specimens of plants, mostly from southern California, being the herbarium of Professor A. J. McClatchie. (Purchased from Mrs. A. J. McClatchie.)

36 specimens of flowering plants from Colorado. (By exchange with Professor F. E. Clements.)

870 specimens of flowering plants and ferns from North America. (By exchange with the United States National Museum.)

5 specimens of crude drugs. (Given by Dr. H. H. Rusby.)

2 specimens of woods from Colombia. (Given by Mr. W. O. Walcott.)

1 specimen of *Xolisma truncata* from St. Domingo. (By exchange with Professor Ignatius Urban.)

5 specimens of *Rhus* from Michigan. (Given by Dr. R. M. Harper.)

2 photographs of *Agave Roseana* from Lower California. (By exchange with the United States National Museum.)

662 specimens of flowering plants and ferns from Idaho. (By exchange with the University of Wyoming.)

34 specimens of flowering plants from Hong Kong. (Given by Dr. C. B. Robinson.)

78 specimens of polypores from Rhode Island. (By exchange with Mr. H. G. MacMillan.)

53 specimens of fungi from Cadillac, Michigan. (By exchange with Dr. H. D. House.)

2 specimens of *Boletus* from Washington, D. C. (Given by Mr. W. T. Swingle.)

2 specimens of *Diaporthe* from Pennsylvania. (Given by Professor D. R. Sumstine.)

8 specimens of fungi from Ithaca, New York. (By exchange with Cornell University, through Professor G. F. Atkinson.)

1 specimen of *Arisaema pusillum* from New York. (Given by Mrs. N. L. Britton.)

1 specimen of *Rhaphidostigium recurvans* from Connecticut. (By exchange with Dr. George E. Nichols.)

1 specimen of moss from Kansas. (Given by Mr. B. F. Bush.)

2 specimens of lichens from Pinar del Rio, Cuba. (Given by Dr. Eugenio Cuesta.)

6 specimens of *Sclerotium rhizodes* from New Jersey. (Collected by Dr. A. B. Stout.)

4 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)

3 specimens of fungi from Pennsylvania. (By exchange with Professor D. R. Sumstine.)

1 specimen of *Chaetosphaeria brevispinosa.* (By exchange with Professor G. F. Atkinson.)

2 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)

2 specimens of fungi from Alabama. (By exchange with Professor Fred. A. Wolf.)

32 specimens "Ascomycetes" Fascicle 50. (Distributed by Dr. Heinrich Rehm.)

1 specimen of *Helvella californica* from California. (By exchange with E. Roorbach.)

1 specimen of *Ustilago Sacchari* from the Philippines. (By exchange with Dr. C. B. Robinson.)

1 specimen of *Lachnea scutellata* from Washington. (By exchange with Dr. F. C Frye.)

1 specimen of *Inocybe Lorillardinana* Murrill from New York City. (Given by Mr. L. O. Overholts.)

2 specimens of fleshy fungi from Oxford, Ohio. (By exchange with Professor Bruce Fink.)

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EDITOR

FRED J. SEAVER

Curator

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ound caused by the larva of the leopard-moth in the trunk and branches of the maple; left, side view of a burrow with the larva in place; right, face view of a wound in a smaller branch. Reduced nearly one-half.

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THE LEOPARD-MOTH.

WITH PLATES C, CI AND CII.

Like many of our most destructive plant parasites this insect was introduced into this country from Europe. Its presence was reported in Brooklyn about twenty years ago, and a little later its destructive work was discovered in Central Park, New York. It is now thoroughly established in the East and is the most destructive of the wood-borers both on account of the extent of the damage accomplished by each individual and by reason of the large number of ornamental trees and shrubs which it attacks.

The larva of this moth has been known and combatted to some extent in the New York Botanical Garden for several years, but it is only recently that the identity of the insect has been recognized. Since the identity and habits of any parasite must be known before it can be combatted intelligently the object of the present paper is to recall what is known of the habits of this insect and to call the attention of the public to the amount of damage which is accomplished by it with the hope of impressing upon them the necessity of the employment of more thorough means of suppressing the pest.

LIFE HISTORY.

The larvae upon hatching make their way to the smaller branches, usually a crotch, and bore into the tissues of the host, increasing rapidly in size. At maturity the larva attains a length of two inches, and is a nearly cylindrical white grub with a brownish-black head and posterior segments. The larva may

be known by its large size and by the markings which consist of a number of black dots on each of the main segments, usually a pair on each side and two pairs near the dorsal side.

Several writers have called attention to the migratory habits of the larva when partly grown; leaving the smaller branch in which it begins its work it proceeds to a larger branch, or in the case of comparatively young trees to the main trunk Here it bores out a large cavity often an inch wide and several inches long just under the bark. It then works toward the heart-wood, leaving a channel often one-half inch in diameter and six or more inches in length. The writer has observed one larva about an inch in length busily engaged in boring its way into the main trunk of a silver-maple about four inches in diameter a few inches above ground. The work was apparently just begun, for the cavity was shallow, and the body of the larva protruded from the new cavity half its length.

It requires two years for the insect to complete its life cycle. At the end of the first season the larva is half-grown and has made its way to one of the larger branches. The caterpillar remains in a dormant state during the first winter and resumes feeding the next spring, and toward the end of the second summer attains its full size. The second winter is passed in this condition and the next spring they form their pupae near the surface. The adult, which is a large white moth with black spots, emerges in the early summer, being most abundant in late June or early July. The eggs are deposited either singly or in masses in the crevices of the bark, each adult depositing five hundred to one thousand.

Plants Attacked by the Insect.

It is claimed by some that this insect attacks practically all deciduous shade-trees and many shrubs. A careful study of this insect in the New York Botanical Garden during the past season has shown it to be present on various trees and some shrubs, but some trees have thus far seemed to be free from the pest. The following account may be given of the plants attacked and the amount of damage resulting from this insect in our grounds:

Unsightly scars resulting from the wounds made by the leopard-moth.

The trees most commonly attacked are the maples, especially the silver-maple and the sugar-maple. It is difficult to find a maple which does not, or has not, harbored one or more of these borers. When entering the small branches the latter are weakened and often broken. If not broken, the bark originally covering the excavation made by the insect soon decays, leaving large holes in the sides of the branches, retarding their growth and often killing them thus disfiguring the tree. When the insect has entered the main trunk the attempts on the part of the tree to heal the wound results in the formation of large unsightly scars. These wounds are also the gateways for the entrance of other insects and fungi, and the wood is gradually decayed, weakening the tree and destroying its beauty. As the trees become older the insects restrict their attacks to the branches rather than the main trunk.

A large amount of damage has also been done to the ash-trees by this insect. It is difficult to find an ash-tree one to three inches in diameter in our grounds which has not been attacked by one or more of these borers and usually in their main trunks. One or two of these borers in the main trunk of a two-inch tree will so weaken and disfigure it that the tree is worthless. Probably more damage has been done to the young recently planted ash-trees in the Garden than to any other tree, doubtless due in part to the fact that more individuals of this tree are planted than of the other favorite hosts of this insect.

The box-elder is also a favorite host for this insect and damages to this tree are similar to those of the maples. This is probably of minor importance, since the box-elder is not so commonly planted.

A few sepcimens were also obtained from cultivated shrubs, *Spiraea* sp. and *Viburnum opulus*.

The basswood is also subject to considerable injury. A number of large larvae have been removed from the main trunks of basswood trees planted in conspicuous places in our grounds, although on the whole this tree does not seem to be attacked to the same extent as the ash and maple.

Several specimens were also obtained from the main trunks and smaller branches of the pin oak.

In various places this moth has been reported as doing great damage to the elm. Although there is some evidence outside of the Garden that the elms are attacked, so far not a single elm has been found to contain this borer within our grounds. Of course it has been impossible to examine the branches of the larger trees, and although it has not yet been found on our elms it is probable that the elm is also subject to the attacks of this insect.

It has been reported as attacking the tulip-tree, but none of our trees have thus far been found to be infected. The sycamore also seems thus far to be free from it.

Methods of Detecting its Presence.

During the early process of the boring the partly digested wood is thrown out of the opening made as the larva enters the tree and falls to the ground below. After the cavity becomes sufficiently large the opening is carefully closed by a whitish semitransparent web-like membrane. The opening through which the larva entered the tree being at this time completely covered, it is difficult to detect the point of attack except as guided by the droppings below. The wood around the wound however is usually darkened by the flow of sap, so that this will aid in locating the exact spot. The droppings are so characteristic that one can be reasonably certain of the presence of these insects by examining the ground underneath the tree. Guided by this the exact point of attack can also be located.

On one occasion the position of a large borer was located in the trunk of a young ash-tree and a small hole was cut to make sure of the presence of the insect. Having no means of removing the larva it was left until the following morning. At this time the same tree was visited and it was found that the larva had carefully recovered the hole made into its burrow. It was again opened and the larva—in this case about two inches in length—was removed.

The first step then in determining the presence of these insects is to carefully examine the ground under the tree for their characteristic droppings. It is then only the matter of a little time to locate the point at which the insect has entered the tree.

Basswood broken as a result of a wound caused by the leopard-moth.

Means of Control.

The "key-note" in the control of this pest is "eternal vigilance." As has already been mentioned, it is comparatively easy to detect the presence of this insect, but unfortunately it is not usually detected until the worst of its damage has been done. If, however, young and newly planted trees were closely inspected during the summer it is possible that many of these larvae could be detected before they have penetrated far into the tree. If the trunk of the tree could be protected the smaller branches could be pruned off when infected without ruining the entire tree. The destruction of the larvae even after the damage has been done to the tree would still be beneficial in preventing the spread of the insect, and this is no small item, since a single adult is able to lay a large number of eggs. In several cases during this season the larvae have been detected just as they were penetrating the bark, and destroyed. In such cases a double purpose is served, the destruction of the larva and the protection of the tree attacked.

There are two ways of destroying the larvae after they have entered the tree—(1) by injecting a poison such as bisulfid of carbon into the burrow and stoppping up the hole with putty and (2) by removing the larva with a wire provided with a hook or barb at the end. It is as easy to remove the larva as to kill it with poison, and this is probably the surest means of getting rid of it. The channels are nearly straight and so large that there is no difficulty in reaching them in this way.

The smaller infested branches on old trees should be removed and destroyed, and small trees which are badly infested in the main trunk should be replaced with healthy ones of the same kind, or as is still better, with those which are free from the attacks of this insect, if such trees can be found. The ash seems to be especially susceptible to this as well as to the ash-borer and it is doubtful if it should be planted to any great extent unless plans are made to guard it closely against these enemies.

Local control of this insect in parks ought to be easily effected, since it is claimed that the adult female cannot fly far, but is often blown from one tree to another. If this is the case local

inspection of trees and destruction of larvae should yield beneficial results.

Most strenuous means should be adopted for the detection and control of this insect in cities and parks, since it threatens the destruction of many of our most valuable shade-trees.

FRED J. SEAVER.

BOTANIZING IN THE YELLOWSTONE PARK.

Miss Julia T. Emerson and Miss Winifred J. Robinson spent six weeks in July and August, camping and horseback riding in Yellowstone Park with a party under the direction of Professor Shattuck, of the Department of Geology, Vassar College. They made a collection of flowering plants for Vassar College and a small collection of fleshy fungi and mosses for the New York Botanical Garden, taking photographs of many of these plants and the localities where they were found.

The park boundary, about fifty miles from Cody, is marked by a military station, where every one who enters is properly registered. Miss Robinson had permission from the Department of the Interior to collect and remove plants from the park and carried a letter from Colonel Brett, military director of the park, instructing the soldiers to this effect.

On the fifth day of July, when the party left Cody, Wyoming (6,000 ft. elevation), the mesa above the town was yellow with cactus blossoms. The walls of the cañon of the Shoshone River were often gay with the rosettes of an evening-primrose, which bore on limp stems large white flowers that became pink the second day; also many forms of *Sedum* were at home here where the rocks kept them warm at night. The great Shoshone Dam is twelve miles distant and a thousand feet higher than Cody, and beyond that the cactus disappeared, the gray mountain sage giving the prevailing note of color except where alfalfa and other crops were made green as a result of irrigation.

From such desert-like conditions it was startling in one day to climb to Sylvan Pass and see the yellow adder's-tongue piercing the edges of the snow-banks, and delicate blue and yellow violets

blooming in the middle of July. Near Lake Yellowstone in the long grass of the marshes the shooting-star suggested our cultivated *Cyclamen* in color and form. Here too were the white smartweed and a dwarf yellow evening-primrose. A blue lily and a light yellow *Anemone* grew where water from the roadside springs trickled down.

It was a most stimulating experience to climb from some 7,500 up to the 10,000 ft. of the summit of Mt. Washburn, and one's eyes were bewildered in turning from the ever-widening view which, in the dry mountain-air stretched for fifty to seventy miles, to the variety of rock- and light-loving plants which made the roadside "with their beauty gay." At the foot of the mountain there was an abundance of the low larkspur which is so injurious to cattle in the West, especially when it is uprooted after rains, so that they eat the root as well as the leaves. Along the slopes grew what might have been a snow-drop save for its yellow color. Higher up a yellow and a small red stonecrop formed their rosettes among the rocks. The white phlox, which had been seen in snowy patches along the tree-lined roadside, became small white stars, while at the bleak windy summit a crustaceous lichen formed the only vegetation. The descent on the southwestern slope of the mountain was through an Alpine garden, rivalling the high meadows of the Tyrol in splendor of color, in which the forget-me-not and other intensely blue flowers gave the prevailing tone.

At Lost Creek a large-flowered member of the carrot family made the banks white and the beautiful pink blossoms of the twin-flower hid among its green leaves upon the pinnacled rocks, from which Lower Falls sent its white shaft down (100 ft.) to the water-worn boulders below.

Close to the mud-geyser on the road to the cañon of the Yellowstone River, a little yellow *Gerardia* grew on the crusty lime formation in spite of the sulphurous odors which had killed the trees in the neighborhood. In the upper geyser-basin and at Mammoth Hot Springs the marvel was that so many things should grow in the vicinity of the geyser-cones. There were acres of the bluest of fringed gentians in Gibbon Meadows and these,

as well as the purple leek, grew in riotous profusion between Lone Star Geyser and the stream near it, while more wonderful was the luxuriant growth of green algae in the small stream near Fountain Geyser in water so hot that one could not bear to put his hand into it.

In the flat lands near the smaller lakes to the south, the lodge pole pine woods were stretches of gray and blue, for here the blue lupine found most congenial conditions in the sunlight sprinkled through the scant tufts of needles and had a perfect background in the gray trunks. At Shoshone Lake the yellow pond-lily blossoms were of very large size and brilliant yellow, shading into deep orange, while rain made the shores of Lewis Lake abound in fleshy fungi about the first of August, species of *Boletus* *Russula*, and *Lactaria* being represented.

At Snake River on the southern boundary of the park the coral honeysuckle gave pleasing change in color after the predominance of blue and yellow flowers. Here the sergeant of the military station had made a very decorative frieze of pressed and mounted plants for his room.

The trees in the park are lodge pole and limber pines, fir, spruce, two species of poplar and willows. The forester in charge takes the utmost pains to prevent forest fires, which are a great menace to the beauty of the park, though the timber is not merchantable. The weight of the winter's snow was evidenced by the curving branches of the pines and the height (ten feet or more from the ground) at which beavers had gnawed off the tops of the trees for their dams.

Honeysuckles, species of *Viburnum* and *Spiraea*, wild currants and gooseberry bushes, and the white flowery raspberry grew along the wooded roadsides, while the sage-bush with stems six or eight inches in thickness grew in the drier, open and wind-swept areas.

The mosses were apparently represented by only a few species and but one liverwort, a *Marchantia*, was observed.

Altogether the effect of the massing of such quantities of a given kind of flower was more like what one sees in England than anywhere in the eastern United States.

NOTES, NEWS AND COMMENT.

Professor B. M. Davis, of the University of Pennsylvania, visited the Garden recently to make observations on the work in plant breeding.

Professor C. C. Curtis is taking his sabbatical year of absence from active service at Columbia University.

Dr. Jacques Huber, director of the Goeldi Museum of Natural History and of the Botanical Garden of Pará, Brazil, who was in the city to attend the Third International Rubber Exposition, was a recent visitor at the Garden.

Professor Francis E. Lloyd, recently elected MacDonald Professor of Botany in McGill University, Montreal, visited the Garden on September 27.

Dr. W. A. Murrill recently spent two weeks collecting fleshy fungi at Lake Placid in the Adirondack Mountains.

Mr. John F. Waby, head gardener of the Botanic Gardens at Georgetown, British Guiana, visited the Garden on Thursday, September 19. He has been located in Georgetown for thirty-five years.

Dr. Ira D. Cardiff, formerly of Columbia University and the Garden, has recently resigned his position of professor of botany in Washburn College to accept the position of professor of plant physiology in Washington State College and physiologist to the Experiment Station at Pullman.

Dr. F. D. Heald, professor of botany in the University of Texas, has resigned to accept the position of pathologist to the Pennsylvania Chestnut Tree Commission, Philadelphia.

Professor J. W. Harshberger, of the University of Pennsylvania, visited the Garden on October 9, to examine some of the south Florida specimens in connection with his studies in the phytogeography of that region.

Dr. C. A. Darling, of Columbia University, spent the summer in Europe, visiting a number of the principal botanical centers.

In addition to the many asters which may be used to brighten the herbaceous border in the fall, there are four other plants especially desirable at this time of the year. One of these is *Polygonum polystachyum*, a vigorous grower, with an abundance of feathery masses of white flowers, having a fragrance somewhat resembling that of the common buckwheat, a relative of which it is. Stems three or four feet long are produced, each terminated with a flower cluster, the flowering period extending over several weeks, beginning in September. Another plant, sometimes known as the hardy *Ageratum*, which will add a touch of blue to the fall border, is *Conoclinium coelestinum*, or *Eupatorium coelestinum* as it is often called, a native of the southeastern United States. The color of the flowers is much like that of the common Mexican *Ageratum conyzoides*, but this has the advantage of being a hardy perennial, while the other is a tropical annual. Another excellent blue flower is *Aconitum Fischeri*, a native of northern Asia. Its richly colored flowers appear late in August or early September, and continue up into October. One of the latest blooming of the sunflowers is *Helianthus Maximiliani*, of our own western country, and is the fourth of the quartet referred to. It is a tall stately plant, with drooping leaves, excellent for the rear of the herbaceous border. Its habit is graceful, and its starry bright-yellow flowers continue in profusion until late in the fall.

In a bed devoted to the crowfoot family, on an elevation in the herbaceous grounds, are two trees of the North American papaw, *Asimina triloba*, a member of the custard-apple family, Anonaceae, largely represented in tropical countries. These have matured a few fruits this fall. To those who like it, the fruit appears delicious, but it is an acquired taste with many. The tree grows naturally, chiefly in river valleys, from western central New Jersey to western New York, southern Ontario, Michigan, and Kansas, south to Florida and Texas. It was very common along the banks of the Susquehanna River, at Harrisburg, Pennsylvania, where the writer lived for many years. At its best development it reaches a height of twenty feet and a trunk diameter of ten inches. The flowers are borne on the wood

of the previous year. The six petals are at first green, later becoming purple. The fruit, ripening in the autumn, is cylindric-oblong, and is four to six inches long and about one and a half inches in diameter. It is yellow when ripe, and is filled with an edible pulp and many flattened dark brown shining seeds, placed transversely. The genus *Asimina* is confined to the North American continent, some seven or eight other species occurring in the southeastern United States, especially in Florida.—G. V. N.

Meteorology for September.—The total precipitation recorded for the month was 3.80 inches. Maximum temperatures were recorded of 90° on the 6th, 91° on the 9th, 80° on the 16th, and 72° on the 26th. Also minimum temperatures were recorded of 60° on the 5th, 51° on the 13th, 48° on the 22d, and 37° on the 30th.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

2 specimens of *Vittaria* from Panama. (By exchange with the United States National Museum).

26 photographs of specimens of the genus *Struthiopteris*. (Given by Miss Jean Broadhurst.)

4 specimens of boxwood and wood-cuts. (Given by Miss Alice Donlevy.)

1 drawing of the type specimen of *Wallenia elliptica*. (From the Royal Gardens, Kew, England.)

554 specimens from the Mexican boundary. (By exchange with the United States National Museum.)

1 specimen of *Rhododendron Lapponicum* from Mt. Marcy, New York. (Given by Mr. W. A. White.)

1 specimen of the fruit of *Cocos datil* from Mexico. (Given by Mr. J. C. Harvey.)

14 specimens of flowering plants from New Mexico. (Given by Professor T. D. A. Cockerell.)

1 specimen of *Tetraneuris herbacea* from Illinois. (By exchange with Field Museum of Natural History.)

21 specimens of Malpigiaceae from Panama. (By exchange with the United States National Museum.)

1 walking-stick made of cocoanut-wood from Venezuela. (Given by Mr. W. O. Walcott.)

2 specimens of the fruits and seeds of *Canavali caribaea* from Tobago, West Indies. (Given by Mr. W. E. Broadway.)

3 photopraphs of specimens of *Rubus*. (By exchange with the Berlin Botanical Garden.)

150 specimens from North Dakota. (By exchange with Dr. J. Lunell.)

19 specimens of flowering plants from Utah. (By exchange with Professor A. O. Garrett.)

1 specimen of *Sambucus* from Pennsylvania. (Given by Professor D. R. Sumstine.)

3 specimens of *Rubus* from the eastern United States. (Given by Mr. K. K. Mackenzie.)

1 specimen of a moss from Arkansas. (Given by Mr. B. F. Bush.)

1 specimen of *Lycoperdon sculptum* from California. (Given by Mrs. Eloise Roorback.)

10 specimens of polypores from Okazak, Japan. (By exchange with Mr. J. Umemura.)

1 photograph of *Lycoperdon giganteum* from Japan. (Given by Professor A. Yasuda.)

40 specimens of fleshy fungi from Oxford, Ohio. (Given by Mr. L. O. Overholts.)

4 specimens of fleshy fungi from Stockbridge, Massachusetts. (Given by Mr. D. D. Field.)

25 specimens of fungi from the Catskill Mountains, New York. (Given by Miss Florence Willey.)

775 specimens of plants from Washington and Oregon. (By exchange with the United States National Museum.)

25 specimens "Mycotheca Boreali-Africana." (Distributed by R. Maire.)

2 specimens of fungi from Porto Rico. (By exchange with Mr. George L. Fawcett.)

1 specimen of fungus from Colorado. (By exchange with Dr. F. D. Kern.)

93 specimens of fungi from North Dakota. (By exchange with Dr. J. F. Brenckle.)

38 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)

10 specimens of fungi from Iowa. (Given by Dr. F. J. Seaver.)

10 specimens of fungi from West Virginia. (By exchange with Professor John L. Sheldon.)

5 specimens of fungi from Ohio. (By exchange with Professor B. Fink.)

3 specimens of fungi from Wisconsin. (Given by Dr. B. O. Dodge.)

31 specimens from New York. (Given by Dr. F. J. Seaver.)

PLANTS AND SEEDS.

6 plants of *Polystichum varium*. (Given by Mr. W. A. Manda.)

31 cactus plants for conservatories. (Given by Dr. R. E. Kuntze.)

3 plants, 1 each of *Carnegiea gigantea*, *Echinocactus Lecontei*, and *E. Wislizenii*. (Purchased from Dr. R. E. Kuntze.)

15 plants of *Opuntia*. (Purchased from Burbank's Experiment Farm.)

8 plants for conservatories. (Given by Miss E. M. Kupfer.)

68 plants for conservatories. (Purchased from Montariosa Nursery.)

15 plants of *Fragaria*. (Given by Miss E. M. Kupfer.)

4 plants of *Xyris arenicola*. (Given by Mr. K. K. Mackenzie.)

10 dahlia bulbs. (Given by Dr. H. H. Rusby.)

1 plant of *Bougainvillaea*. (Given by Mr. S. G. Batchelor.)

5 Cuban cactus plants for conservatories. (Given by Brother Leon.)
1 plant of *Mamillaria nivosa* from Grand Turk. (Given by Mr. C. B. Frith.)
6 plants for conservatories. (By exchange with Miss Helen M. Gould.)
6 plants of *Mozinna sessilifolia* from Texas. (Given by Mr. J. W. Drummond.)
1 plant of *Carex plantaginea.* (Given by Mrs. J. R. Delafield.)
1 plant of *Opuntia.* (Given by Dr. D. T. MacDougal and Mr. G. Sykes.)
22 plants of *Dionaea muscipula.* (Given by Mr. M. F. von Klein.)
14 orchid and cactus plants from Cuba. (Given by Mr. Manley Fitch Gates.)
30 plants of *Drosera.* (Given by Mrs. L. E. Frank.)
9 bulbs from South Africa. (By exchange with Dr. C. J. Chamberlain.)
2 plants of *Opuntia.* (By exchange with U. S. Dept. of Agriculture, through Mr. S. M. Tracy.)
67 Cuban plants. (Collected by Dr. J. A. Shafer.)
2 plants of *Mamillaria vivipara.* (By exchange with U. S. National, Museum, through Dr. J. N. Rose.)
142 cactus plants for conservatories. (By exchange with U. S. National Museum, through Dr. J. N. Rose.)
25 plants of *Opuntia.* (By exchange with U. S. National Museum, through Dr. J. N. Rose.)
2 plants of *Gormania oregana.* (By exchange with U. S. National Museum, through Dr. J. N. Rose.)
8 plants for conservatories. (By exchange with Bureau of Plant Industry.)
716 plants derived from seeds from various sources.
1 packet seed of *Xanthoceras sorbifolia.* (By exchange with Fairmont Park.)
4 packets of Mexican palm seeds. (By exchange with Dr. J. C. Harvey.)
7 packets of Hawaiin seed. (Given by Mr. W. J. MacNeil.)
7 packets of seed. (Given by Dr. H. H. Rusby.)
5 packets of seed. (By exchange with Royal Botanic Garden, Calcutta, India.)
4 plants of *Dionaea muscipula.*
115 plants from Cuba. (Collected by Dr. N. L. Britton and Mr. J. F. Cowell.)
60 plants for outdoor collections. (Given by Mr. R. Boeder.)
3 plants of *Cytherea bulbosa.* (Given by Dr. C. C. Curtis.)
9 water lilies. (By exchange with Mr. Wm. Tricker.)
1 plant of *Aerides virens.* (By exchange with Messrs. Knight & Struck.)
2 orchids for conservatories. (By exchange with Messrs. Lager & Hurrell.)
4 plants of *Nephrolepis muscosa.* (Given by F. R. Pierson Co.)
45 plants of *Comptonia peregrina.* (Collected by Mr. James Finley.)
125 plants for outdoor collections. (By exchange with Buffalo Botanic Garden.)
15 plants of *Hevea brasiliensis.* (Given by Messrs. Henderson & Korn.)
5 plants for conservatories, from Cuba. (Given by Mr. H. J. Nix.)
71 South African bulbs. (Given by Miss Ferguston, through Miss E. Billings.)
3 plants of *Vinca major aurea.* (By exchange with Mr. Wm. Tricker.)
2 plants for conservatories. (By exchange with Buffalo Botanic Garden.)
9 plants of *Agave.* (By exchange with Missouri Botanic Garden.)
1 plant of *Liparis liliifolia.* (Given by Mrs. N. L. Britton.)
27 plants from Cuba. (Collected by Dr. J. A. Shafer.)
7 plants of *Rhus trilobata.* (Purchased.)
450 plants for outdoor collections. (Purchased.)

24 Costa Rican plants. (Given by Mr. C. Wercklé.)

4 cuttings of *Pereskia Nicoyana* from Costa Rica. (Given by Mr. C. Wercklé.)

16 plants for conservatories. (By exchange with Bureau of Plant Industry.)

5 cactus cuttings. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

2 cactus plants for conservatories. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

1 plant of *Trollius laxus*. (Given by Miss Kittredge.)

1 plant of *Helonias bullata*. (Given by Mrs. Geo. L. Frank.)

1 plant of *Leucothoë Catesbaei*. (Given by Mr. H. P. Kelsey.)

1 plant of *Phlox amoena*. (Given by Messrs. G. C. Fisher and G. W. Keitt.)

5 plants of violets. (Given by Miss Fanny Mulford.)

1 plant of *Rubus procumbens*. (Given by Mr. J. P. Otis.)

1 tuber of *Dioscorea*. (Given by Dr. H. H. Rusby.)

1,751 plants derived from seeds from various sources.

5 seeds of the Nipa palm. (By exchange with the Bureau of Agriculture, Manila.)

2 packets of Utah seed. (Collected by Dr. P. A. Rydberg.)

3 packets of Cuban seeds. (Collected by Dr. N. L. Britton and Mr. J. F. Cowell.)

3 packets of seeds. (Given by Dr. H. H. Rusby.)

1 packet of seed of *Mimosa platycarpa*. (Given by Mrs. W. P. Cockerell.)

2 packets of seed. (Given by B. W. Hunt.)

1 packet of seed of *Strongylodon lucidus*. (Given by Mr. W. J. MacNeil.)

1 packet of *Ipomoea* seed. (Given by Mr. T. D. A. Cockerell.)

6 packets of seed from Costa Rica. (Given by Mr. C. Wercklé.)

10 packets of seeds. (Given by Mrs. Francis Brown, through Miss E. Billings.)

1 packet of *Bidens* seed. (Given by Mrs. N. L. Britton.)

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EDITOR

FRED J. SEAVER

Curator

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BOTANICAL EXPLORATIONS IN SANTA CLARA AND ORIENTE.

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: Arriving at Sancti Spiritus, February 13, where I had gone by rail from Havana, I found that the quarters at the hotel were such that it would have been impractical to remain there, so I had some difficulty in finding a suitable stopping-place until the Rev. H. G. Smith solved my problem by taking me into his own home, where he and his good wife did everything to make me comfortable. To them I owe much gratitude. Mr. Smith also helped me in various ways during the time I remained there.

The surrounding region, which is given over almost exclusively to pasturage, was, at this time, quite dry. The various thickets on grass-covered serpentine hills were examined with rather poor results. Rio Yayabo and several of its tributaries were also examined, but little was found along their banks. One little brook north of town, about a mile from the railroad station, was found to be quite rich, especially as to the variety of small trees and shrubs. A small peculiar outcropping of soft, white lime rock, several miles to the eastward, supported a different plant association. Here an upright cactus, probably a *Harrisia*, was of interest.

The chief object of my coming here, however, was to examine the flora of the Banao Hills, but I found that I was at a poorly selected base for that purpose, being too far distant, so that little information concerning them seemed available and no one

appeared to know of a guide with knowledge of the region. The meeting of Señor Rafael Garcia-Rijo, who has large holdings in the region, resulted in suitable arrangements to get into these distant hills. He became greatly interested in my work, and introduced me to Mr. John B. Roosevelt, a retired American engineer, who had done considerable surveying in that region and was pleased to accompany me.

Accordingly we left Sancti Spiritus at daybreak on February 27, with two good horses provided by Mr. Roosevelt, going southward through a series of pasture-lands, crossing several small rivers and low ridges of what appeared to be micaceous shist formation, the flora of which was examined from time to time and some collections made. The town of Banao consists of a very few cheap houses, and like many other rural towns of the island has seen better days, but it would probably make a tolerable base for a more complete examination of the hills. To the north and west the hills are principally of limestone formation. Eastward and northward toward Sancti Spiritus, the hills seem to be of serpentine and micaceous shist. Lomo Obispo is the most prominent and highest of these, but as it looked very dry and was said to be entirely under pasturage, I did not think it advisable to spend the time necessary to reach and ascend it.

From Banao we passed around the southern side of the hills, crossing over some of the foot-hills covered almost exclusively by "corojo," *Acrocomia fusiformis* (Swartz) Cook, intermingled with low spreading trees of "guao," *Comocladia* sp., the rough bark of which is a favorite habitat for a bright rose-colored orchid, probably a *Broughtonia*, which grew in considerable abundance and by its bright rose-colored flowers, added a brilliancy to portions of the otherwise dull landscape. A variety of small shrubs but scarcely any herbaceous plants were seen in this association. Passing northward, after having forded Rio Higuarojo, across an old and long-abandoned sugar plantation, La Seiba, through forests, most of it seemingly of second growth, we reached the home of Mr. William R. Harrison, on the banks of Rio Unimaza, just before dark, having, it was said, traveled sixty miles that day. Mr. Harrison, his father and a brother

each have a home on the old Pitajones tract, and are engaged in planting coffee in the forests, both virgin and second growth. Their method is quite different to that practised in Oriente, as they remove very little of the forest growth the first year and then they gradually thin out the tall trees and remove the undergrowth as the coffee plant requires the space. This method is an inexpensive one and is used by the Cubans, some of whom it is said have been very successful with coffee.

The valley of the Rio Unimaza is quite broad and fertile in this vicinity, its altitude being about 1,000 feet. It is very thinly settled, but there are abundant evidences of a former prosperity, such as a very large individual of the Mexican rain tree, *Pithecolibium Saman*, in the forests and that African pest, *Dichrostachys nutans*, locally called "aroma," forming thorny, impenetrable thickets of great extent, some of these trees attaining a trunk diameter of six inches. In the forests, especially along the streams many interesting plants were seen and collected.

The surrounding hills vary considerably; some are very rocky, quite dry and barren; others being moister, support a rich growth of trees and smaller plants. I got as far north as Ciegos de Ponciano where, in a rich rocky valley, I saw for the first time the Cuban walnut, *Juglans cubensis*, a fine large tree with a trunk diameter of three to four feet.

I remained here until the morning of March 3, during which time the Harrisons did all they could to aid me. One of them usually accompanied me on my excursions into the forests, and to them I owe my sincere thanks. Returning to Sancti Spiritus by the same route, with frequent stops for collecting and at a place called Rincon, secured specimens of the leaf fiber of the "corojo" in two grades; the finest called "pita corojo" is stripped from very young leaves of this spiny palm. It is plaited into bridles, and various other parts of harnesses. "Cascara corojo" is a coarser grade and is used to make rope. Several days were required to dry and pack the collections preparatory to moving on to Manzanillo in Oriente, the environs of which are mostly sugar-cane plantations or pasture-lands and little was obtained in the hill or coastal thickets which I examined. I operated as

far inland as the town of Yara mostly through pasture-land on dry savannas with discouraging results until March 14, when I moved on to the historic town of Bayamo, the immediate vicinity of which I found to be quite similar to that of Manzanillo, and as the foot-hills of the Sierra Miestra are a considerable distance to the south and as I was due to join your party at Santiago, I spent but two days—February 15 and 16—afield there, passing on to Santiago where I made an excursion to San Juan Hill and the river valley beyond, until I joined you on March 21, after which I participated in the various excursions by yourself and Professor Cowell as far as Ensenada de Mora from which place I returned to Santiago April 1, packed and shipped to Antilla my own collections, and those of your party left at Santiago.

Having a day to spare, I went as you suggested to Holguin in quest of a further supply of that rare little cactus, *Coryphantha cubensis* Britton, discovered by me several years ago on a serpentine hill northwest of town. This was secured on March 4 with the kindly assistance of my good friend Angus Campbel after five hours of diligent search. A few other plants not collected in this region heretofore by me were also secured. Next evening I arrived in Antilla and sailed the following day from Nipe Bay, and arrived in New York, April 10, 1912.

Respectfully submitted,

J. A. SHAFER.

CHINESE TEA PAINTINGS GIVEN TO THE MUSEUM.

A series of twelve Chinese paintings representing the cultivation and preparation of tea were presented to the Garden early in the year by Dr. Reginald H. Sayre, of this city, one of the members of the Garden Corporation. They were brought from China for Mr. Charles H. Hall by Mr. John L. Grosvenor about a century ago, and were probably painted about the middle of the eighteenth century. Dr. Sayre says they used to hang in a large hall in his old home and are associated with the earliest

recollections of his childhood. The pictures are in their original frames and measure 23 × 28 inches; the canvas used is of very high grade and the brush work exceedingly delicate. The perspective is excellent, showing that the generally accepted idea that Chinese artists are lacking in this respect is incorrect.

These paintings have been renovated and carefully mounted in four panels placed on the broad landing between the main floor and the second floor of the museum, directly opposite the main entrance of the building. At present, they are not arranged in series, but are grouped so as to give harmonious and pleasing effects and to display each picture in the best light. Taking the panels in order from left to right and the pictures from top to bottom, the subjects represented are, as follows:

Tea leaves being carried from the fields in baskets by laborers.
Tea leaves being tasted by women to determine their quality.
Women receiving baskets of green leaves from the field and taking them to the curing house.

Field of tea plants with women picking the leaves.
Tea leaves being dried over slow fires, mainly by women.
Women assorting the finer grades of tea.

Laborers planting tea.
Cheaper grades of leaves being dried over fires by men.
Grading, packing, and shipping the dried tea.

Laborers preparing the soil for the planting of tea.
Sprinkling the small tea plants with liquid manure.
Bringing tea from a rural plantation to a tea merchant, the ceremonies accompanying a sale being indicated.

The usual tea-picking scene, reminding one of cotton-picking in the southern United States, is notably absent from this series. The presence of so many women and the comfortable houses figured indicate that the better grades of tea are being handled. The word "tea" in China may represent a wide range of variations, from the costliest products of the real tea plant to the cheapest substitutes made from the leaves of willows and other wild shrubs and herbs.

W. A. MURRILL.

COLLECTING FUNGI IN THE ADIRONDACKS.

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Sir: Following your instructions, I spent the last half of July and the first half of October, of the season just passed, in the Adirondack Mountains making a general collection of fungi. An attempt was made to get complete descriptive notes from the fresh specimens of most of the gill-fungi collected, to be used later in publication, and in this I was assisted by Mrs. Murrill, who made sketches of many of them in their natural colors.

Lake Placid was selected as a base and excursions were made by boat and otherwise to desirable collecting regions in the vicinity. Many different kinds of localities were visited, such as pure forests of pine, balsam, and spruce, tamarack swamps, sphagnum bogs, sugar-maple groves, deciduous woods, mixed coniferous and deciduous woods, open fields, and exposed, mossy hilltops. The higher mountains were not visited because we were not there at the proper season for collecting above three thousand feet. It was not our expectation to add many novelties to the known fungous flora of North Elba after the long and brilliant work of Dr. Charles H. Peck, state botanist, in that region, but we hoped to increase our knowledge of this flora and to enrich the Garden herbarium with well selected and well preserved specimens of as many species as possible.

The collection obtained was greater than we had expected, comprising 1,175 field numbers and about 2,000 specimens. Many of these grew on living tree trunks and fallen timber and are of special interest in connection with the care and protection of the state forests situated in the Adirondacks. Others represent edible or poisonous species of gill-fungi and are interesting to those who advocate a wider use of members of this group of plants for food. A majority of the species are different from those found in the vicinity of New York City, belonging as they do to a more northerly phytogeographic area extending from eastern Canada and New England westward to the prairies and southward along the Alleghanies. The fungi of this area have

many points in common with those of northern Europe, being largely of common origin, and the two areas must be studied together before either can be properly understood mycologically.

Our thanks are due the manager of the Grand View Hotel and the officials of the Lake Placid Club for many courtesies extended during our stay in that delightful region.

On our return from Lake Placid, we stopped at Albany to represent the Garden at the dedicatory exercises of the magnificent new State Education Building. The ceremonies, held October 15 to 17, were very elaborate and were attended by several hundred delegates from educational institutions located in various parts of the world.

A list of the polypores and boletes collected at Lake Placid is here appended. It contains most of the wood-destroying species of the region and may serve as a check list for foresters and others interested in this destructive group of fungi.

The Polypores and Boletes of the Lake Placid Region.

Numbers below 400 refer to July collections, and those above 400 to collections made in October. The list of boletes is rather small because most of these plants appeared in August.

POLYPORACEAE.

Antrodia mollis (Sommerf.) Karst. *318*. On deciduous wood.

Bjerkandera adusta (Willd.) Karst. *373*, *466*, *575*. On dead deciduous wood; not common.

Cerrena unicolor (Bull.) Murrill. *332*, *630*. On deciduous wood.

Coltricia perennis (L.) Murrill. *385*. Common.

Coltricia tomentosa (Fr.) Murrill. *419*, *899*. About coniferous stumps.

Coriolellus serialis (Fr.) Murrill. *355*, *587*. On coniferous wood.

Coriolus abietinus (Dicks.) Quél. *320*. Very common on dead balsam fir and other coniferous trees.

Coriolus biformis (Kl.) Pat. *364*. Seen only once.

Coriolus nigromarginatus (Schw.) Murrill. *329*.

CORIOLUS PROLIFICANS (Fr.) Murrill. Very destructive to fallen timber.

CORIOLUS PUBESCENS (Schum.) Murrill. *423, 758, 1046.* One beech log was covered with milk-white sporophores which threw down a distinctly cream-colored spore-print, while another beech log nearby bore avellaneous sporophores which were thinner and yielded no spore-print, possibly because immature.

CORIOLUS VERSICOLOR (L.) Quél. Very destructive both to living and dead timber.

DAEDALEA CONFRAGOSA (Bolt.) Pers. *325.* An interesting and very variable species.

ELFVINGIA FOMENTARIA (L.) Murrill. A common and conspicuous species.

ELFVINGIA MEGALOMA (Lév.) Murrill. *376.* A very common and conspicuous species.

FOMES POPULINUS (Schw.) Cooke. *302, 900.* On sugar maple trunks and stumps.

FOMES ROSEUS (Alb. & Schw.) Cooke. *841.* Common on coniferous logs.

FOMES UNGULATUS (Schaeff.) Sacc. A very common and conspicuous species.

FOMITIPORIA PEREFFUSA Murrill. *159.* This species sometimes covers the entire under surface of deciduous logs. This specimen grew underneath a beech log.

FOMITIPORIA PRUNICOLA Murrill. *378.* Common on standing trunks of *Prunus pennsylvanica.*

FUSCOPORIA FERRUGINOSA (Schrad.) Murrill. *821.* On deciduous logs.

GLOEOPHYLLUM HIRSUTUM (Schaeff.) Murrill. *14, 742, 742½.* Common on coniferous stumps and logs. Also found on a dead spot caused by borers in a trunk of *Prunus pennsylvanica* growing at the edge of coniferous woods.

HAPALOPILUS RUTILANS (Pers.) Murrill. *333.* Collected once, on birch.

HEXAGONA STRIATULA (Ell. & Ev.) Murrill. *352, 365, 374.* On beech and maple logs.

INONOTUS RADIATUS (Sowerby) Karst. *649, 653, 669, 876.* The typical form was found on birch and alder, while the variety described by Peck in 1873 from Indian Lake as *Polyporus glomeratus* occurred only on maple.

IRPICIPORUS LACTEUS (Fr.) Murrill. *305, 965.*

ISCHNODERMA FULIGINOSUM (Scop.) Murrill. *403, 541, 660.* The usual dark, resinous form occurred on stumps and logs of conifers, while the paler, larger form so common on the under side of basswood logs was here found about four feet above the ground on a dead standing sugar maple trunk in an open field.

PHAEOLUS SISTOTREMOIDES (Alb. & Schw.) Murrill. *274.* At the base of a living larch.

PIPTOPORUS SUBEROSUS (L.) Murrill. *375.* Common on birch trunks.

POLYPORUS ELEGANS (Bull.) Fr. *311, 348.* Not common.

POLYPORUS FISSUS Berk. *982.* Seen only once. This species develops much better farther south.

POLYPORUS POLYPORUS (Retz.) Murrill. *690, 737, 1077.* Common on birch sticks and other dead deciduous wood.

PORIA ATTENUATA Peck. *64.* A resupinate species described from Croghan, New York. It occurs throughout the eastern United States on deciduous logs and is distinguished by its beautiful rosy-isabelline color.

PORODAEDALEA PINI (Thore) Murrill. *303, 346, 386.* Very destructive to conifers.

PYCNOPORUS CINNABARINUS (Jacq.) Karst. *371.* Not rare.

PYROPOLYPORUS IGNIARIUS (L.) Murrill. A very common and conspicuous species.

TYROMYCES ANCEPS (Peck) Murrill. *879.* On the south side of a balsam fir stump in a field. Described in 1895 from specimens collected by E. A. Burt on a dead hemlock trunk at Stony Brook, Massachusetts. *T. Ellisianus* Murrill is related, but has larger tubes.

Tyromyces balsameus (Peck). *Tyromyces crispellus* (Peck) Murrill. *859.* Cespitose on coniferous stumps. Described from the Adirondacks by Peck in 1878 as *Polyporus balsameus*, and from Osceola, New York, by the same author in 1885, as

Polyporus crispellus. By a study of fresh specimens, it was possible to combine the two names and to place the species definitely in the genus *Tyromyces.*

TYROMYCES CHIONEUS (Fr.) Karst. *310, 487, 578, 1026.* Not rare on dead deciduous wood.

TYROMYCES GUTTULATUS (Peck) Murrill. *351, 574, 689, 824, 890.* This exceedingly well named species was rather often seen on the tops of stumps of various conifers. It is fragrant, and astringent and slightly acid at first to the taste, becoming bitter after being held in the mouth about two minutes.

TYROMYCES SEMIPILEATUS (Peck) Murrill. *133.* Collected only once, but not rare on deciduous wood in the eastern United States.

BOLETACEAE.

BOLETINUS CAVIPES (Opat.) Kalchb. *970.* Abundant in one spot in low coniferous woods.

BOLETINUS PICTUS Peck. *812.*

BOLETUS CLINTONIANUS Peck. *780.* Under a white pine in moss and grass.

CERIOMYCES AURIPORUS (Peck) Murrill. *561, 1101.*

CERIOMYCES COMMUNIS (Bull.) Murrill. *295, 361, 362, 592.* Common.

CERIOMYCES SUBGLABRIPES (Peck) Murrill. *116.* In dry maple woods.

CERIOMYCES SUBTOMENTOSUS (L.) Murrill. *238, 317.*

CERIOMYCES VISCIDUS (L.) Murrill. *296.* Common.

GYROPORUS CYANESCENS (Bull.) Quél. *1082.*

ROSTKOVITES GRANULATUS (L.) P. Karst. *390.* Rather common.

SUILLELLUS LURIDUS (Schaeff.) Murrill. *298.*

TYLOPILUS FELLEUS (Bull.) P. Karst. *400.* Common and large.

TYLOPILUS GRACILIS (Peck.) P. Henn. *34.* On dead coniferous wood. Tubes melleous, becoming brownish when bruised; context cremeous, unchanging, of nutty flavor.

Respectfully submitted,

W. A. MURRILL,
Assistant Director.

FLOWER EXHIBITIONS.

The Horticultural Society of New York, in coöperation with the Garden, held its exhibitions as usual during the summer and fall, in the halls devoted to paleo-botany on the ground floor of the Museum. The premiums for the July and August exhibitions were offered by the Garden, to be awarded by the exhibition committee of the council of The Horticultural Society of New York. The exhibitions were well attended and gave pleasure to many people. This was especially the case on Sunday afternoons. The flowers at the close of the exhibitons were distributed to hospitals and other similar institutions.

The usual July exhibition was held a little earlier this year, taking place on the last two days of June. The premiums offered were for roses, Japanese irises, sweet peas, herbaceous plants, shrubs and trees, and vegetables. Open-to-all and non-commercial classes were provided for irises and sweet peas.

Mr. A. P. Stokes, of Noroton, Ct., Andrew Whitelaw, gardener, won the first prize for roses, the second going to Mr. H. Darlington, of Mamaroneck, N. Y., P. W. Popp, gardener. Scott Bros. secured the first prize, open to all, for twelve vases of Japanese irises, with an exhibit of superb blooms, Mr. John Lewis Childs, of Floral Park, N. Y., taking second.

Six vases of sweet peas, in the open to all class, won the first prize for Miss M. T. Cockcroft, of Saugatuck, Ct., Adam Paterson,gardener, the second going to Mrs. J. B. Trevor, of Yonkers, N. Y., Howard Nichols, gardener. Miss Cockcroft also took the first prize for a vase of sweet peas, Mr. H. Darlington, second.

To Mrs. F. A. Constable, Mamaroneck, N. Y., James Stuart, gardener, was awarded the first prize for a collection of flowers of herbaceous plants. A large collection of the flowers of shrubs and trees gave the first prize to Mr. T. A. Havemaeyer, of Glen Head, N. Y., A. Lahodny, gardener, the second to Mr. H. Darlington.

To Mr. James A. Macdonald, Flushing, N. Y., Richard Hughes, gardener, was awarded the first prize for six vases of Japanese irises, in the class for non-commercial growers, the second to Mr.

T. A. Havemeyer. Among non-commercial growers, for three vases of sweet peas, the first prize was secured by Miss M. T. Cockcroft, the second by Mrs. J. B. Trevor.

The classes for vegetables were open to all. Twelve vegetables gave Mrs. J. B. Trevor the first prize, and Mrs. F. A. Constable the second. Six vegetables brought the first prize to Mr. James A. Macdonald, the second to Mr. T. A. Havemeyer. Special mention was made of a collection of miscellaneous plants exhibited by Mr. John Lewis Childs. Special prizes were awarded to: Mr. Louis C. Tiffany, of Oyster Bay, N. Y., John Miller, gardener, for twelve chrysanthemum blooms; and to Mr. T. A. Havemeyer, for collections of lilies and hydrangeas.

The Garden exhibited large collections, not for competition, of the flowers of herbaceous plants and of shrubs and trees.

The August Exhibition was held Saturday and Sunday, August thirty-first and September first. On account of Monday, the second, being Labor Day, the exhibition was continued through that day. It was primarily an exhibition of gladioli, for which most of the premiums were offered; a few premiums were offered for montbretias. Prizes were offered in classes open to all and for non-commercial growers. There was a large and magnificent display of these attractive flowers, filling the two long center tables and several side tables. The flowers were in excellent condition at the close of the exhibition and were sent to hospitals and other institutions.

A large collection of gladioli, excellent flowers, exhibited by Mr. John Lewis Childs, almost filled one of the long center tables, and secured for him the first prize for a collection of named varieties, in the open to all class. For twelve varieties, three spikes of each, in the same class, the first prize was awarded to Mr. Arthur Cowee, of Berlin, N. Y., for a collection of superb flowers, the second going to Mr. T. A. Havemeyer. Mr. Cowee also captured the first prize, in the class open to all, for the best vase of any white variety of gladiolus, twenty-five spikes. The first prize for a table center piece went to Mr. T. A. Havemeyer.

The prizes offered to non-commercial growers were won as follows: For a collection of named varieties of gladioli, the first

by Mr. T. A. Havemeyer, the second by Mr. H. Darlington. For six varieties of gladioli, two spikes of each, the first by Mr. Havemeyer, the second by Mr. Darlington. For a vase of any white variety, six spikes, the first by Mr. Havemeyer, the second by Mr. Darlington. For a vase of any pink variety, six spikes, by Mr. Havemeyer.

The first prize for a collection of montbretias, in the class open to all, was won by Mr. John Lewis Childs; that for non-commercial growers by Mr. H. Darlington.

The exhibition of Saturday and Sunday September twenty-eighth and twenty-ninth, was also held in the Museum building, New York Botanical Garden. This was arranged mainly for dahlias and asters. The inclement weather just previous to the time of the exhibition so damaged these flowers that few were fit for exhibition purposes. Mr. H. Darlington won first prizes for the following: collection of fifty dahlias; collection of twenty-five dahlias; and for five each of show, decorative, cactus, and peony-flowered; vase of ten single dahlias.

The Garden made an exhibit of the flowers of herbaceous plants.

GEORGE V. NASH.

LATE AUTUMN LECTURES, 1912.

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock as follows:

Nov. 23. "Recent Exploration in Bermuda," by Dr. N. L. Britton.

Nov. 30. "A Botanical Expedition to Cuba," by Dr. W. A. Murrill.

Dec. 7. "Some Floral and Scenic Features of Jamaica," by Dr. M. A. Howe.

Dec. 14. "The Vegetation of Southern Florida," by Mr. G. V. Nash.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. The doors will be closed at 4:00, and opened again for a moment at 4:15 to admit those arriving late.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

NOTES, NEWS AND COMMENT.

Dr. P. A. Rydberg, curator, is spending several weeks studying in the United States National Museum, Washington, D. C.

Dr. John K. Small, head curator, left New York, October 31, for southern Florida, where he will spend several weeks studying the flora of that region. Professor Hugo de Vries will accompany him on this expedition.

Dr. Arthur Hollick, curator, has a three months' leave of absence from the Garden and will spend the time in a continuation of his studies of the fossil flora of Alaska. The work will be carried on at the United States National Museum.

Mr. Stewardson Brown, curator of botany in Philadelphia Academy of Sciences, spent several days at the Garden in October and November studying recent collections of Bermuda plants.

Dr. Fred J. Seaver gave a lecture before the Horticultural Society at the American Museum of Natural History, October 26 on "Insect Parasites and Some Means of Controlling Them."

Miss Vera Charles, of the United States Department of Agriculture, visited the Garden in October to examine the collections of fungi.

Dr. W. A. Murrill, assistant director, represented the Garden at the dedicatory exercises of the new State Education Building held in Albany, October 15 to 17.

Mr. Frank Meyer, agricultural explorer for the United States Department of Agriculture, visited the Garden recently. He will soon sail for China where he will conduct botanical exploration in the interior for the next three or four years.

The regular meeting of the Torrey Botanical Club held in the museum on October 30 consisted of a symposium on the flora of Bermuda. The subject was introduced by Dr. Britton and the discussions were participated in by the various persons who have collected and studied the plants of those islands.

Professor Jules de Schokalsky, president of the Section of Physical Geography in the Imperial Geographical Society of Russia, and Major General of the Imperial Russian Marine, and Professor Vladimir Doubiansky, curator of the Imperial Botanical Gardens of St. Petersburg, visited the Garden on October 21 to examine the herbarium and museum and to arrange for an exchange of museum material from desert regions.

Dr. N. L. Britton, director-in-chief, accompanied by Mrs. Britton, attended and participated in the exercises in connection with the unveiling of the tablet on the oldest and largest tree on the island of Manhattan at Inwood. The tree is a tulip and measures 19 feet in circumference and is probably more than two hundred years old.

The autumn lectures to the 4B and 5B pupils of the public schools were held during the latter part of October and early November. The weather was unusually favorable and the lectures were well attended.

Meteorology for October.—The total precipitation recorded for the month was 3.44 inches, of which two inches fell within two hours on the 23d. Maximum temperatures were recorded of 82.5° on the 6th, 73° on the 18th, 69° on the 21st, and 74° on the 30th. Also minimum temperatures were recorded of 39° on the 2d, 42° on the 9th, 36° on the 16th, and 38° on the 26th. There was no killing frost during the month.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

256 specimens of flowering plants from Quebec. (Given by Professor C. S. Williamson.)

1 specimen of *Drepanocladus uncinatus* from Connecticut. (By exchange with Dr. George E. Nichols.)

3 specimens of mosses from Ithaca, Wisconsin. (By exchange with Dr. J. M. Greenman.)

3 specimens of mosses from Oregon and Michigan. (Given by Dr. H. D. House.)

34 specimens of mosses from Washington. (By exchange with Mr. A. S. Forster.)

115 specimens of mosses from the herbarium of J. J. Crooke. (Given by Dr. N. L. Britton.)

1 specimen of *Galactia nummularia* from St. Martin, West Indies. (By exchange with the Botanical Garden, Utrecht, Holland.)

11 specimens of hepatics from New England. (Given by Miss Annie Lorenz.)

6 specimens of fleshy fungi from Mantoloking, New Jersey. (Given by Mrs. F. M. P. Pearse.)

11 specimens of fleshy fungi from Bronx Park. (Collected by Miss Mary E. Eaton.)

1 specimen of *Vaccinium Sintenisii* from Porto Rico. (By exchange with the Royal Botanical Garden, Berlin, Germany.)

2 photographs *Cavendishia Endresii* and *C. latifolia*. (By exchange with the Royal Gardens, Kew, London, England.)

2 specimens of *Rubus* from tropical America. (By exchange with the Royal Botanical Garden, Berlin, Germany.)

13 specimens of flowering plants from Guatemala. (By exchange with Professor T. D. A. Cockerell.)

13 specimens of gill-fungi from Plandome, New York. (Given by Dr. W. S. Thomas.)

15 specimens of fleshy fungi from Stockbridge, Massachusetts. (Given by Mr. D. D. Field.)

1 specimen of *Fissidens crassipes pennsylvanicus* from Pennsylvania. (Given by Dr. A. F. Krout.)

1 photograph of the type specimen *Vaccinium caracasanum*. (From the Botanical Garden, Brussels, Belgium.)

1 photograph of the type specimen of *Vaccinium pachyphyllum*. (From the Royal Gardens, Kew, London, England.)

2 specimens, *Thibaudia costaricensis* and *T. domingensis*. (By exchange with the Royal Botanical Garden, Berlin, Germany.)

1 photograph of *Satyria clonantha*. (From the Royal Gardens, Kew, London, England.)

1 specimen of fungus from California. (Given by Professor J. C. Arthur.)

60 specimens of fleshy fungi from the Bronx. (Collected by Dr. W. A. Murrill.)

19 specimens of flowering plants from Utah. (By exchange with Professor A. O. Garrett.)

3 specimens of flowering plants from Vermont. (Given by Miss Margaret Slosson.)

1 specimen of *Pinus Banksiana* from Michigan. (Given by Dr. R. M. Harper, through the United States Forest Service.)

1 photograph of *Ostrya virginica* from New York. (Given by Mr. M. J. Breitenbach.)

1 trunk of *Hevea brasiliensis* from Ceylon. (Given by Mr. F. Crosbie Roles.)

2,152 specimens from Pinar del Rio, Cuba. (Collected by Dr. J. A. Shafer.)

93 specimens of flowering plants from Porto Rico. (By exchange with the Agricultural Experiment Station, Porto Rico, West Indies.)

10 specimens of *Rosa* from North Dakota. (By exchange with Dr. John Lunnell.)

534 specimens of flowering plants from South Dakota. (By exchange with Professor S. S. Visher.)

2,000 specimens of fungi from the Adirondacks. (Collected by Dr. W. A. Murrill.)

PLANTS AND SEEDS.

1 plant of *Persea Persea.* (Given by Mrs. Noble.)

1 plant of *Crinum* sp., from Vera Cruz, Mexico. (By exchange with Dr. J. C. Harvey.)

10 plants of *Opuntia.* (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

142 plants for conservatories, from Bermuda. (Collected by Dr. N. L. Britton and Mr. Stewardson Brown.)

96 cactus plants from western Kansas. (Collected by Dr. J. N. Rose and Mr. Wm. R. Fitch.)

1 plant of *Marica.* (Given by Mrs. John P. Althoff.)

3 plants for outside collections. (Given by Miss E. Kittredge.)

21 plants of *Hevea brasiliensis.* (Given by Federated Malay States, through Rubber Exhibition.)

4 plants of *Hevea brasiliensis.* (Given by N. Y. Commercial Co.)

24 plants for conservatories. (Given by German Kali Works.)

6 cycads. (By exchange with Botanical Garden, Glasnevin, Dublin, Ireland.)

4 plants for outside collections. (Given by Mrs. W. Gilman Thompson.)

1 plant of *Beaucarnea recurvata.* (Given by Dr. C. Nicolai.)

1 plant of *Peristeria elata* from Panama. (Given by Dr. J. F. Kemp.)

4 plants of *Epidendrum* from Jamaica. (By exchange with Department of Agriculture, Jamaica.)

24 plants derived from seeds from various sources.

1 packet seed of *Passiflora* from Bermuda. (Collected by Dr. N. L. Britton and Mr. Stewardson Brown.)

1 packet seed of *Cocos Datyl*, from Mexico. (By exchange with Dr. J. C. Harvey.)

1 packet of Cuban seed. (Collected by Dr. J. A. Shafer.)

1 packet of seed of *Xiphidium xanthorrhizon.* (Collected by Dr. J. A. Shafer.)

2 packets palm seeds from Mexico. (By exchange with Dr. J. C. Harvey.)

LIBRARY ACCESSIONS FROM JULY 15 TO OCTOBER 15.

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Vol. 7, part 1, 1906; part 2, 1907; part 3, 1912. Ustilaginaceae—Aecidiaceae (p[illegible]).

Vol. 9, parts 1 and 2, 1907; part 3, 1910. Polyporaceae—Agaricaceae (pars). (Parts 1 and 2 no longer sold separately.)

Vol. 16, part 1, 1909. Ophioglossaceae—Cyatheaceae (pars).

Vol. 17, part 1, 1909; part 2, 1912. Typhaceae—Poaceae (pars).

Vol. 22, parts 1 and 2, 1905; parts 3 and 4, 1908. Podostemonaceae—Rosaceae (pars).

Vol. 25, part 1, 1907; part 2, 1910; part 3, 1911. Geraniaceae—Burseraceae.

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Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by Arthur Hollick and Edward Charles Jeffrey. viii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 278 pp., with 73 figures and 14 plates. 1908.

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FRED J. SEAVER

Curator

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JAMES A. SCRYMSER.

Term expires January, 1915.

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JOHN I. KANE,
W. J. MATHESON,
W. GILMAN THOMPSON.

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WALTER S. GROESBECK, *Clerk and Accountant.*
ARTHUR J. CORBETT, *Superintendent of Buildings and Grounds.*

Bay Lavender (*Tournefortia gnaphalodes*) Coast of Coney Island, Bermuda.

JOURNAL

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The New York Botanical Garden

VOL. XIII. December, 1912. No. 156.

BOTANICAL EXPLORATION IN BERMUDA.

WITH PLATES CIII, CIV, CV, CVI, CVII.

TO THE SCIENTIFIC DIRECTORS.

Gentlemen: For the purpose of further studying the flora of Bermuda, and the presumable origin of the plants composing that flora, I spent the period from August 26 to September 21 on those islands, accompanied by Mrs. Britton and by Mr. Stewardson Brown, curator of botany in the Philadelphia Academy of Natural Sciences; and accompanied by Mr. Brown, and by Dr. Fred J. Seaver, a curator of our museums, the period from November 29th to December 14th, was given to the same investigation; I had previously given three weeks to this study with Mrs. Britton and Mr. Brown, in the autumn of 1905,* during which period a large portion of the land area of about 19¼ square miles was studied and collections aggregating 427 field numbers were made. These were supplemented by Mr. Stewardson Brown in the winter of 1908 by 231 field numbers and again by him in the spring of 1909 by 66 field numbers,† and further by a collection of 85 field numbers by Miss Delia West Marble. also in the spring of 1909. The two expeditions of 1912 obtained over 650 field numbers. A total of more than 1,450 separate collections of plants have thus been made during the progress of this investigation and these aggregate over 5,000 specimens.

Previous to 1905, the collections of Bermuda land plants available for students in New York consisted only of a few specimens

* See Journal N. Y. Bot. Gard. 6: 153–158. 1905.

† See Proc. Acad. Nat. Sci. Phila. 1909: 486–494. 1910.

preserved in the herbarium of Columbia University, obtained by Mr. I. F. Holton in 1854 and presented by him to Dr. Torrey, and a small lot brought back by Professor James F. Kemp in 1885, contained in the same herbarium.* The collections obtained during the present expedition have made the representation of the Bermuda flora at the New York Botanical Garden the best in the world; a nearly complete duplicate set of the herbarium specimens has been deposited at the Academy of Natural Sciences in Philadelphia.

Attention has been given to the study and collecting of all land plants, cryptogams as well as phanerogams.

To Mr. Benjamin D. Gilbert's "Revision of the Bermuda Ferns" published in 1898,† we have added no species.

Mrs. Britton's work on the mosses has added greatly to the known species growing in Bermuda.

An account of the liverworts was published by Professor A. W. Evans in 1906;‡ one species has since been added.

Dr. Marshall Avery Howe of our staff visited Bermuda in the summer of 1900, and made large collections of marine algae, but other visits at different times in the year are necessary to make his knowledge of the algal flora measurably complete. There is little known as yet about the microscopic algae.

The numerous lichens collected are now being studied by Professor L. W. Riddle and others.

The fungus flora is not completely known. A considerable number of specimens have been collected and partly studied by specialists. The "Challenger" Expedition obtained only 23 species of fungi, but there are very many more. Mr. and Mrs. Bernard O. Dodge collected some 40 species in the summer of 1911. Our second trip of 1912 was especially organized for the study and collection of these plants by the presence of Dr. Seaver, who obtained over 150 species, which are now being studied.

Biologically, and as regards origin, interest centers on the species native to this little archipelago, so far separated from

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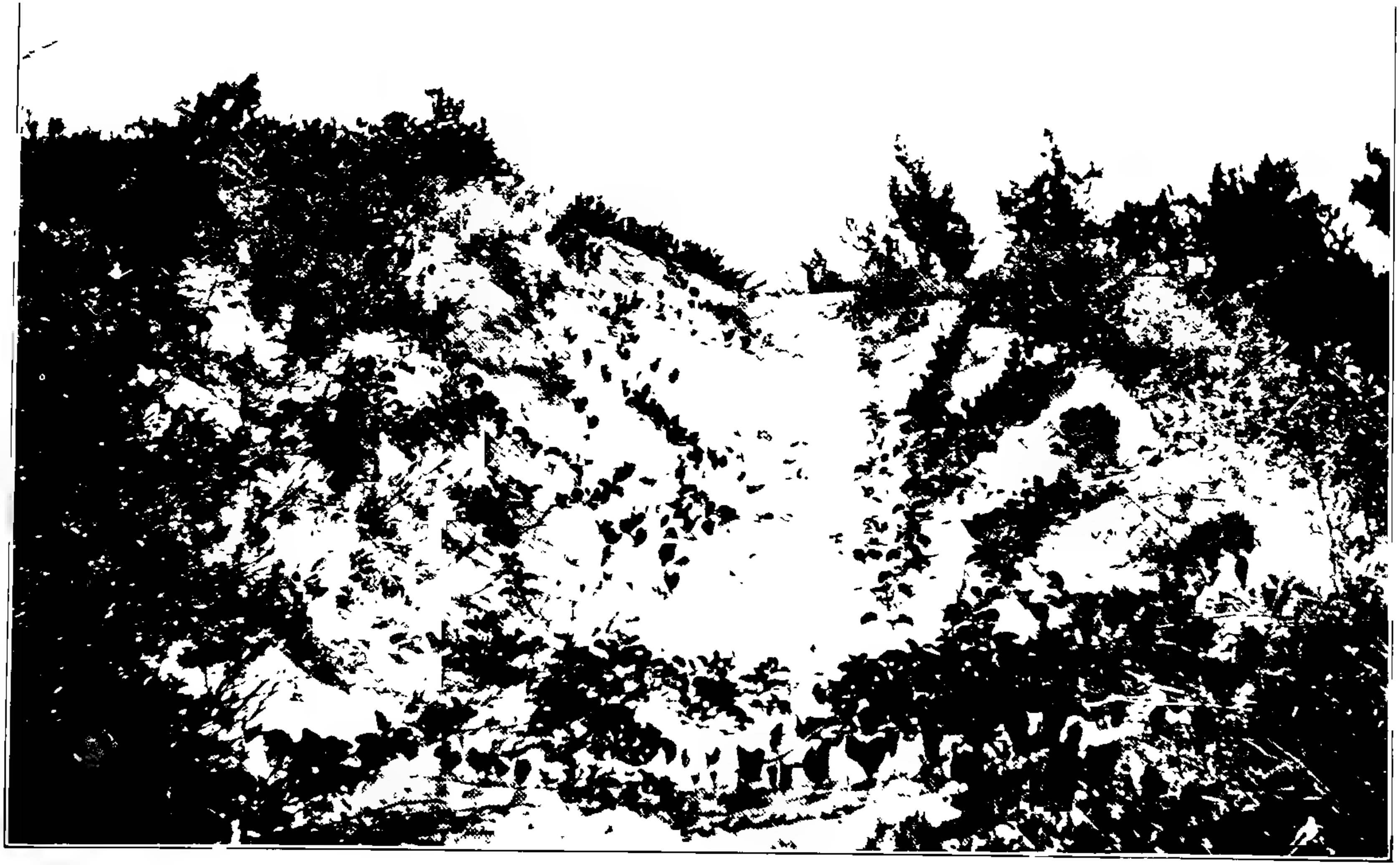
* See Bull. Torrey Bot. Club **12**: 45–48. 1885.

† See Bull. Torrey Bot. Club **25**: 593–604. 1898.

‡ See Bull. Torrey Bot. Club **33**: 129–135. 1906.

BERMUDA RED CEDAR (*Juniperus bermudiana*) HARRINGTON HOUSE, BERMUDA. A ENDEMIC BERMUDA SPECIES.



SAND DUNE WITH VINES OF BAY-BEAN (*Canavali lineata*) AND OF BEACH MORNING-GLORY (*Ipomoea Pes-caprae*), NEAR TUCKER'S TOWN, BERMUDA. BOTH OCCUR IN SIMILAR SOIL IN FLORIDA AND THE WEST INDIES.

other land both in distance and by the abysses of the ocean. The approximate number of these known up to the present time is indicated in the following table.

Flowering plants	150	species,	of	which	about	10	are	endemic.
Ferns and fern allies	19	"	"	"		4	"	"
Mosses and moss allies	51	"	"	"		3	"	"
Lichens	50	"	"	"	some	6	"	"
Fungi	175	"	"	"	at least	8	"	"
Algae	250	"	"	"	some	5	"	"
	About 695				About	36		

Some species of land plants recorded as observed in Bermuda many years ago cannot be found there now, and these have either been obliterated by the destruction of their habitats, or some of the old records are erroneous. Some species previously regarded as native, seem more likely to have been introduced.

The endemic flowering plants, ferns and mosses now increased by subsequent study from my estimate of 11 in 1905 to 16 or 17 are related in greater or lesser degree to species of the West Indies, the southeastern United States or tropical continental America, the two apparent exceptions to this relationship noted in my report of 1905 having since been found to have American congeners. They are not nearly as closely related to old world types as to American, and the conclusion that they have been derived from American ancestors by modification or mutation during long periods of isolation from their relatives seems inevitable. Knowledge of the endemic lichens and fungi is as yet too imperfect to yield a similar conclusion, but this appears likely, and the five endemic algae are American in affinity.

Excluding the endemic lichens, fungi and algae, the nearest living relatives of the endemic species appear to be as follows; this suggested relationship need not imply that the Bermuda species have been derived from the others, but common ancestry is probable.

1. **Eleocharis bermudiana** Britton,* Bermuda Spike-rush, nearest to *Eleocharis albida* Torrey, of the southeastern United States and West Indies.

*__Eleocharis bermudiana__ Britton, n. sp. Culms slender, weak, 3 dm. long or less; spikelet thicker than that of *E. albida*, the black trigonous achene short-beaked. Marshes. Type from South Shore Road, Bermuda (*Brown and Britton, No. 240*).

2. **Carex bermudiana** Hemsley, Bermuda Sedge, nearest to *Carex Walteriana* Bailey, of the southeastern United States.
3. **Sabal Blackburnianum** Glasebrook, Bermuda Palmetto, nearest to *Sabal Palmetto* (Walt.) Lodd., of southeastern United States, Bahamas and Cuba.
4. **Peperomia septentrionalis** S. Brown, Bermuda Peperomia, nearest to *Peperomia obtusifolia* (L.) Dietr., of Florida and the West Indies.
5. **Sisyrinchium bermudianum** L., Bermuda Iris, related to *Sisyrinchium alatum* Hooker of Mexico more closely than it is related to any species of the United States or the West Indies.
6. **Eleaodendron Laneanum** A. H. Moore, Bermuda Olivewood, nearest to *Eleaodendron attenuatum* A. Rich., of Cuba and the Bahamas.
7. **Ascyrum macrosepalum** S. Brown,* Bermuda St. Andrew's Cross, nearest of *A. linifolium* Spach of Florida and the Bahamas.
8. **Chiococca bermudiana** S. Brown, Bermuda Snowberry, Blolly, nearest to *Chiococca alba* (L.) Hitchc., of Florida and the West Indies.
9. **Erigeron Darrellianus** Hemsley, Bermuda Fleabane, apparently related to *Aster falcatus* Klatt., of Central America.
10. **Juniperus bermudiana** L., Bermuda Red Cedar, nearest to *Juniperus lucayana* Britton, of the Bahamas.
11. **Adiantum bellum** Moore, Bermuda Maidenhair-fern, nearest to *Adiantum cuneatum* Langsd. & Fisch., of South America. Recently recorded from Guiana, but the equivalency not yet proven.
12. **Diplazium Laffanianum** (Baker) Christensen, Governor Laffan's Fern, nearest to *Asplenium Mildei* Kuhn, of the South American Andes, according to Gilbert.

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* **Ascyrum macrosepalum** S. Brown, n. sp. Differs from *A. linifolium* Spach, by the larger leaves; broadly ovate, heart-shaped sepals which are 10–12 mm. long and 7–9 mm. broad and in the seeds which are greenish brown instead of black and larger, nearly 1 mm. long, and broader in proportion to their length. Frequent in marshes and on hillsides. Type from Paget Marsh, Bermuda (*Brown and Britton, No. 1136*).

BERMUDA TAN-BARK (*Elaeodendron Laneanum*) NEAR CASTLE HARBOR, BERMUDA.

13. **Dryopteris bermudiana** (Baker) Gilbert, Bermuda Shield-fern, nearest to *Dryopteris asplenioides* (Sw.) Kuntze, of Jamaica, and perhaps not specifically distinct from it.
14. **Dryopteris Speluncae** (L.) Underwood, Ten-day Fern, apparently nearest related to *Dryopteris ampla* (H. & B.) Kuntze, of the West Indies and tropical continental America.
15. **Campylopus bermudianus** R. S. Williams,* Bermuda Campylopus, nearest to *Campylosus tortuosus* (Hampe) Paris, of the West Indies.
16. **Tortula bermudiana** Mitten. The affinity of this presumably endemic Bermuda moss has not yet been satisfactorily determined.
17. **Crossotolejeunea bermudiana** Evans, Bermuda Hepatic, nearest to *Crossotolejeunea paucispina* (Spruce) Steph., of Brazil and Guadeloupe.

The following species have been described from Bermuda specimens and supposed to be endemic:

1. **Rynchospora domuccensis** A. H. Moore is *Rynchospora distans* (Michx.) Vahl, of the southeastern United States and Cuba.
2. **Limonium Lefroyi** (Hemsl.) Britton is *Limonium carolinianum* (Walt.) Britton, of the eastern United States.
3. **Euphorbia bermudiana** Millsp. is *Euphorbia Blodgettii* Engelm., of Florida, Bahamas, Cuba and Jamaica.
4. **Galium bermudianum** L. is the same as *Galium hispidulum* Michx. of the Southeastern United States and the Bahamas.

The native species of flowering plants, ferns and mosses, other than the endemic ones, all exist on the American mainland or on West Indian islands. About eighty per cent. of them grow in Florida or the West Indies, or in both these regions. The greater portion of the native land flora has, then, come to Bermuda from the southwest.

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* **Campylopus bermudianus** R. S. Williams, n. sp. Forming dull green tufts about 4 cm. high, smaller than *C. tortuosus;* leaves 6 mm. long or less, about one-third as long as those of *C. tortuosus*, the costa only about one-half as wide. Paget Marsh, Bermuda (*Stewardson Brown, No. 651*).

I reject, as merely fanciful, the theory that Bermuda area of land and shoal has ever had land connection, either with the continent or with the West Indies.

An analysis of the native flora excluding the thallophytes, indicates that the transportation of all its species may reasonably be referred to one or the other of three methods.

1. All the halophytic (salt-loving) species, and those with fruits which can retain vitality in salt water have floated to Bermuda. These number 41. All the marine algae have come in the same way.
2. Hurricane winds sweep all light objects in the course of the storm to great heights in the atmosphere, from which they slowly fall over very wide areas. To this transportation through the air may confidently be referred spores of all land cryptogams, and seeds and fruits of flowering plants appended so as to float readily in the air, such as those of some grasses and composites. In this category some 83 species are to be included.
3. To migratory birds, carrying seeds and fruits swallowed by them for food, or mechanically attached to their bodies and thus transported in flight, are to be referred the function of bringing the smaller-seeded species of the native flora, other than those transported by water or wind. These number about 97.

N. L. BRITTON,
Director-in-Chief.

CONFERENCE NOTES.

The November conference of the scientific staff and registered students of the New York Botanical Garden was held in the laboratory on the afternoon of November 4, with Dr. Murrill presiding.

Mr. F. D. Fromme gave a report of the studies which he made during the past summer under a scholarship granted by the New York Botanical Garden. In the collection and study of parasitic fungi particular attention was given to the rusts. Collections

BERMUDA PALMETTO (*Sabal Blackburnianum*). PEMBROKE MARSH, BERMUDA. AN ENDEMIC BERMUDA SPECIES.

were made in the vicinity of New York City, at several points in New Jersey and at Woods Hole and the nearby islands on the coast of Massachusetts. Some fifty species of rusts in all were collected on seventy hosts. All forms were collected in duplicate. One set will be added to the herbarium of the New York Botanical Garden and the other will be sent to Professor Arthur. Some of the forms obtained are especially interesting and will prove a valuable addition to the collection in the herbarium.

There was also given by Dr. A. B. Stout a summary of his observations during the past year on bud variation in *Coleus Blumei*. In these studies two plants which produced bud sports during the autumn of 1911 were used as parents and cuttings from both the parent stock and from the bud sports were grown to determine the constancy of the leaf coloration and the tendency to produce new bud variations.

The leaves of the parent plants have a color pattern of green, red, and yellow with the yellow strongly developed toward the margins of the leaves. On these plants, and on plants grown from cuttings, several branches appeared with the leaves lacking the yellow blotches. One parent plant has produced two bud sports, one with no yellow in the leaves and one with the leaves almost entirely red in color. This plant now possesses three different kinds of branches in regard to leaf coloration.

One of the plants grown from the first series of cuttings has produced several branches bearing leaves with the green at the margin and the yellow in the center. The color pattern has been reversed. Two other plants have produced branches showing the color pattern arranged in the stem and leaves as a sectorial chimera.

Living plants showing these different kinds of variation were exhibited.

Pedigreed cuttings of these plants will be grown for a continued and a more intensive study of the phenomena of bud variation.

A. B. Stout.

NATURE-STUDY LECTURES TO PUBLIC SCHOOL CHILDREN.

The nature-study lectures, with accompanying demonstrations, to the pupils of 4B and 5B grades of the Public Schools of the Bronx were given in the lecture hall of the Museum Building of the Garden during October and November.

The course included ten lectures which were delivered by Dr. N. L. Britton, Dr. H. H. Rusby, Dr. M. A. Howe, Mr. G. V. Nash, and Dr. F. J. Seaver, assisted by six teachers as demonstrators.

With the exception of the lecture on the afternoon of November 7, which was abandoned on account of inclement weather, two lectures were held on each lecture day, the first commencing at 10:15 A.M. and the second at 1:45 P.M.

The accompanying table of attendance was prepared by Principal Stevens of Public School 44.

4B Lectures.						5B Lectures.					
A. M. Lectures.		P. M. Lectures.		Total.		A. M. Lectures.		P. M. Lectures.		Total.	
Teachers	Pupils	Teachers	Pupils	Teachers	Pupils	Teachers	Pupils	Teachers	Pupils	Teachers	Pupils
14	403	26	634	40	1037	9	241	16	436	25	677
13	255	00	000	13	255	11	349	18	465	29	814
						11	329	13	312	24	641
				53	1292					78	2132
Grand total, both grades						.....				131	3424

NOTES, NEWS AND COMMENT.

Dr. Ezra Brainerd, of Middlebury College, Vermont, spent several days at the Garden in November in continuation of his work on violets.

Dr. C. F. Millspaugh, curator of botany in The Field Museum of Natural History, Chicago, spent several days at the Garden in November compiling notes for a second edition of his "Flora of West Virginia."

The BULLETIN of the New York Botanical Garden volume 8, number 28, was issued November 23. This number contains the following papers: "New Species from Bolivia Collected by R. S. Williams," by Dr. H. H. Rusby; "The Polyporaceae of Mexico," by Dr. W. A. Murrill, and "Additions to the Paleobotany of the Cretaceous Formation on Long Island," by Dr. Arthur Hollick. This number contains the descriptions of 143 species previously unpublished.

The regular annual meeting of the American Association for the Advancement of Science was held in Cleveland, Ohio, December 31, 1912, to January 3, 1913. Representatives from all of the leading scientific institutions were in attendance and participated in the reading and discussions of scientific papers.

Meteorology for November.—The total precipitation recorded for the month was 2.47 inches. Maximum temperatures were recorded as follows: 65° on the 6th, 74° on the 12th, 68° on the 21st, and 52° on the 30th. Minimum temperatures were recorded of 25° on the 4th, 32.5° on the 10th, 26° on the 19th, and 22° on the 28th. The first killing frost of the season was on November 3.

ACCESSIONS.

MUSEUMS AND HERBARIUM.

1 specimen of *Herpotrichia nigra* from Colorado. (By exchange with Dr. F. D. Kern.)

75 specimens, "Fungi Dakotenses," fascicles 5, 6 and 7. (Distributed by Dr. J. F. Brenckle.)

1 specimen of *Nectria Ipomoeae* from New Jersey. (By exchange with Dr. M. T. Cook.)

1 specimen of *Tubercularia vulgaris* from Indiana. (By exchange with Dr. F. D. Kern.)

4 specimens of fleshy fungi from Staten Island, New York. (Given by Dr. B. O. Dodge.)

1 specimen of *Hydnum Caput-ursi* from Staten Island, New York. (Coll. by Mrs. N. L. Britton.)

30 specimens of fungi from Marshfield, Oregon. (By exchange with Dr. H. D. House.)

15 specimens of fleshy fungi from New Jersey. (By exchange with Mrs. F. M. Pearse.)

2 specimens of fungi from Indiana. (By exchange with Dr. F. D. Kern.)

1 specimen of fungus from Porto Rico. (By exchange with Dr. F. D. Kern.)

150 specimens of fungi from New York. (Collected by Dr. F. J. Seaver.)

1 specimen of *Porodisculus pendulus* from Pennsylvania. (By exchange with Mr. Paul J. Anderson.)

34 specimens of fungi from Washington. (By exchange with Mr. S. M. Zeller.)

4 specimens of fleshy fungi. (Collected by Professor R. A. Harper.)

36 specimens of fleshy fungi from Yellowstone National Park. (By exchange with Dr. W. J. Robinson.)

22 specimens of fungi from Seattle, Washington. (By exchange with Mr. S. M. Zeller.)

960 specimens of flowering plants from Jamaica, West Indies. (Collected by Mr. William Harris.)

18 specimens of fungi from Porto Rico. (By exchange with Brother Hioram.)

6 specimens of *Drepanocladus* from Montreal, Canada. (By exchange with Professor H. Dupret.)

1 specimen of *Papillaria nigrescens* from Florida. (By exchange with Mr. Severin Rapp.)

7 specimens of mosses from South Dakota. (By exchange with Mr. S. S. Visher.)

4 specimens of mosses from Pictou, Canada. (Given by Dr. C. B. Robinson.)

68 specimens of flowering plants from Porto Rico. (By exchange with Brother Hioram.)

2,500 specimens from Cuba. (Collected by Dr. and Mrs. N. L. Britton, Mr. John F. Cowell and Miss Harriet L. Britton.)

93 specimens of flowering plants from Porto Rico. (By exchange with Agricultural Experiment Station, San Piedras, Porto Rico.)

53 specimens of flowering plants from Cuba. (By exchange with Brother Leon.)

120 specimens of mosses from North America. (From the herbarium of J. H. Hart.)

2 specimens of *Atriplex* and *Eriogonum* from the western United States. (Given by Dr. E. L. Greene.)

353 specimens of flowering plants from Nevada. (Collected by Dr. A. A. Heller.)

1 specimen of *Phlox subulata* from New York. (Given by Professor J. F. Kemp.

2 specimens of mosses from Quebec, Canada. (By exchange with Professor H. Dupret.)

40 specimens of flowering plants from Colorado. (By exchange with Mr. George Osterhout.)

1 specimen of *Linaria Linaria* showing spurred and spurless peloria. (Given by Mr. John Macallum.)

3 specimens of *Chamaesyce* from Louisiana. (Given by Mr. E. C. Wurzlow.)

2 museum specimens of *Holacantha Emoryi* from Arizona. (Given by Dr. R. E. Kunze.)

1 specimen of *Juniperus bermudiana* from Harrington Sound, Bermuda. (Given by Dr. N. L. Britton.)

6 specimens of drugs. (Given by Dr. H. H. Rusby.)

1 specimen of *Melochia corchorifolia* from Louisiana. (Given by Mr. E. C. Wurzlow.)

85 specimens, mostly *Cacti*. (By exchange with the Smithsonian Institution.)

12 specimens from Stockbridge, Massachusetts. (Collected by Dr. N. L. Britton.)

350 specimens of *Cacti*. (Collected from plants under cultivation in the greenhouses, mostly by R. S. Williams.)

3 photographs of *Macleania insignis*, *Thibaudia laurifolia*, and *Vaccinium cordatum*. (From the Botanical Garden, Brussels, Belgium.)

1 specimen of *Sophoclesia nummularifolia*. (By exchange with the Botanical Garden, Berlin, Germany.)

5 specimens, with photographs, of *Cavendishia glutinosa*, *C. Graebneriana*, *C. Wercklei*, *C. costaricensis*, and *C. Hoffmanni*. (By exchange with the Botanical Garden, Berlin, Germany.)

6 specimens of flowering plants from Russia. (By exchange with the United States Department of Agriculture.)

1 specimen of *Eugenia uniflora* from Harrington House, Bermuda. (Given by Dr. N. L. Britton.)

1 specimen of Japanese plum. (Given by Dr. H. H. Rusby.)

1 specimen, with photograph, of *Vaccinium fissum*. (By exchange with the Royal Botanical Museum, Munich, Germany.)

2 photographs of *Vaccinium eriocladum* and *V. micranthum*. (From the De-Candolle Herbarium.)

1 photograph of *Vaccinium Myrsinites*. (From the Museum of Natural History, Paris, France.)

2 specimens, with photographs, of *Vaccinium angustifolium* and *V. angustifolium glaucescens*. (From the Royal Gardens, Kew, England.)

7 specimens of mosses from North and South America. (By exchange with Mr. Jules Cardot.)

5 specimens of Hepaticae from Maine. (By exchange with Miss Annie Lorenz.)

10 specimens of marine algae. (By exchange with Mrs. A. Weber-van-Bosse.)

14 specimens of ferns from America. (By exchange with the Bonaparte Herbarium, Paris, France.)

4 specimens of lichens from Washington. (By exchange with Mr. A. S. Foster.)

1,500 specimens from Bermuda. (Collected by Dr. and Mrs. N. L. Britton, Mr. Stewardson Brown, and Fred J. Seaver.)

100 specimens "Uredineen," fascicles XLIX and L. (Distributed by H. & P. Sydow.)

25 specimens "Phycomyceton et Phycometen," fascicle VII. (Distributed by H. & P. Sydow.)

35 specimens "Ascomycetes," fascicle 51. (Distributed by Dr. Heinrich Rehm.)

6 museum specimens from Bermuda. (Given by Dr. N. L. Britton.)

280 specimens of flowering plants from Texas. (Distributed by Mr. Albert Ruth.)

2 specimens of peat from the Everglades and Miami River, Florida. (Given by Mr. C. F. Sulzner.)

1 root of *Ficus aurea* from an open well near Miami, Florida. (Given by Mrs. Russell H. Nevins.)

2 museum specimens from Cuba. (Collected by Mr. Percy Wilson.)

114 specimens of flowering plants from Tobago, West Indies. (Distributed by Mr. W. E. Broadway.)

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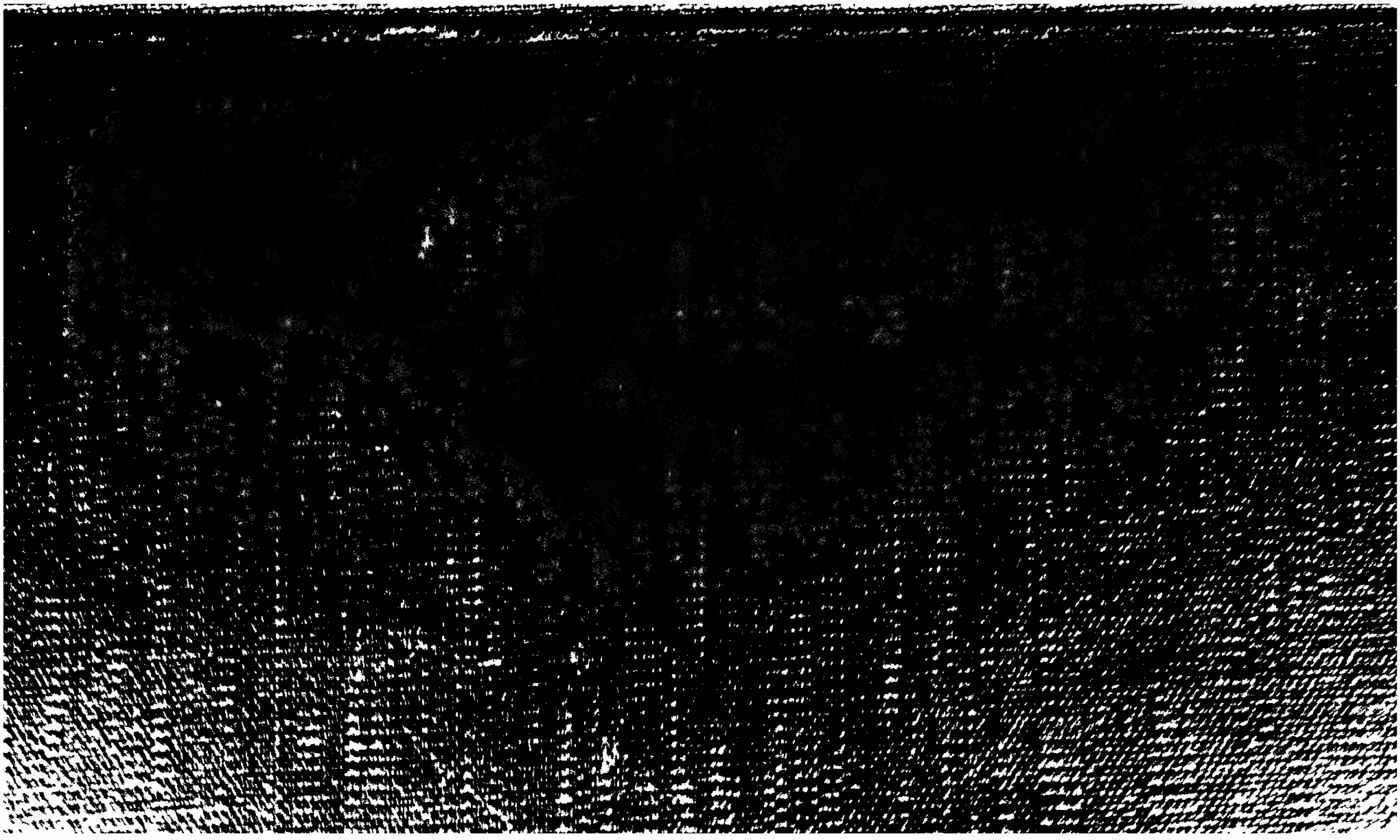

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OF

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EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

VOLUME XIV

WITH 20 PLATES

1913

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JOURNAL

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The New York Botanical Garden

VOL. XIV January, 1913 No. 157

THE CHARLES FINNEY COX COLLECTION OF DARWINIANA

At a meeting of the Board of Managers held January 30, 1912, it was resolved that a permanent memorial of the late Charles Finney Cox, for many years Treasurer of the Garden and one of its original incorporators, be established. It was subsequently ascertained that the important collection of books, pamphlets and other documents relating to Charles Darwin formed by Mr. Cox could be purchased, and a subscription to make this purchase possible was authorized. The subscription was completed in the autumn by contributions from the following members of the Garden Corporation and other friends of Mr. Cox.

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John D. Archbold
George F. Baker
N. L. Britton
Joseph E. Brown
W. H. Canniff
Andrew Carnegie
J. D. Cox
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Cleveland H. Dodge
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William D. Sloane
James Speyer
Samuel Thorne
Louis C. Tiffany
W. K. Vanderbilt
Edward A. Wickes

The collection will be installed in a special case in the reading

room of the Garden library. The following catalogue prepared by Dr. J. H. Barnhart, Bibliographer, gives an account of this valuable acquisition.

N. L. BRITTON,
Director-in-Chief.

CATALOGUE OF THE COX COLLECTION OF DARWINIANA

Darwin Family

Genealogy:

1. BURKE, HENRY FARNHAM (1859–). Pedigree of the family of Darwin. Privately printed. 60 copies only. [With portraits and other illustrations.] 23 p. London, 1888.

Erasmus Darwin (1731–1802)

Grandfather of Charles Robert Darwin

Biography:

2. SEWARD, ANNA (1747–1809). Memoirs of the life of Dr. Darwin, chiefly during his residence in Lichfield, with anecdotes of his friends, and criticisms on his writings. xii, 313 p. Philadelphia, 1804.
   This is an American reprint of the London edition published in the same year; the London edition is not in the collection.
3. KRAUSE, ERNST LUDWIG (1839–1903). Erasmus Darwin. Translated from the German by W[ILLIAM] S[WEETLAND] DALLAS [(1824–1890)]. With a preliminary notice by CHARLES DARWIN. Portrait and woodcuts. iv, 216 p. London, 1879.
4. KRAUSE, ERNST LUDWIG (1839–1903). Erasmus Darwin. Translated from the German by W[ILLIAM] S[WEETLAND] DALLAS [(1824–1890)]. With a preliminary notice by CHARLES DARWIN. Portrait and woodcuts. iv, 216 p. New York, 1880.
5. KRAUSE, ERNST LUDWIG (1839–1903). Erasmus Darwin und seine Stellung in der Geschichte der Descendenz-Theorie. Mit seinem Lebens- und Charakterbilde von CHARLES DARWIN. Nebst Lichtdruck-Portrait und Holzschnitten. vi, 236 p. Leipzig, [1880].
   Darwinistische Schriften. No. 6.

Books by Erasmus Darwin:

6. Zoonomia; or, the laws of organic life. 2 vols. London, 1794–96.
   Vol. I. viii, 586 p. London, 1794.
   Vol. II. xi, 772 p. London, 1796.

   BROWN, THOMAS (1778–1820). Observations on the Zoonomia of Erasmus Darwin, M.D. xxiv, 560 p. Edinburgh, 1798.
7. A plan for the conduct of female education, in boarding schools. 128 p. Derby, 1797.
8. Phytologia; or the philosophy of agriculture and gardening. With the theory of draining morasses, and with an improved construction of the drill plough. viii, 612, [12] p., *12 pl.* London, 1800.
9. The temple of nature; or, the origin of society: a poem, with philosophical notes. [6], 174, 124 p., *1 pl.* London, 1803.

   Published posthumously.

Manuscript letter of Erasmus Darwin:

10. A letter [to Joseph Banks (1743–1820)], dated at Radborne near Derby, July 23 [17]82.

Charles Robert Darwin (1809–1882)

Biography:

11. DARWIN, FRANCIS (1848). The life and letters of Charles Darwin, including an autobiographical chapter. In three volumes. London, 1887.
    Vol. I. x, 395 p.
    Vol. II. [iv,] 392 p.
    Vol. III. iv, 419 p.

    This beautifully bound, elaborately extra-illustrated, and unique copy of the "Life and letters" is of particular interest on account of the personal care bestowed upon it by Mr. Cox. It contains no fewer than 398 extra plates. Of these, 372 are portraits, including 8 of Charles Darwin, 6 of Erasmus Darwin, and one each of Robert Waring Darwin (father of Charles), Mrs. Charles Darwin, George Howard Darwin, Francis Darwin, and Leonard Darwin. There are also inserted 24 autograph letters, including 7 of Charles Darwin and 2 (to Mr. Cox) of Francis Darwin. In the first volume is included a printed 14-page "Index of portraits and other illus-

trations added to Charles Darwin's Life and letters by Charles F. Cox," which, with manuscript additions, serves as an index to the extra-illustrations. In the second volume is inserted a pamphlet (xl p.) entitled "Unpublished letters of Charles Darwin in the collection of Charles F. Cox, New York." The originals of some of these letters are among those mentioned above as bound in the present work; the others are in the manuscript portion of the Cox Collection.

12. DARWIN, FRANCIS (1848–). The life and letters of Charles Darwin, including an autobiographical chapter. In two volumes. New York, 1888.

    Vol. I. viii, 558 p.

    Vol. II. iv, 562 p.

    This copy of the American 2-volume reprint of the "Life and letters" was evidently used by Mr. Cox in the preparation of the extra-illustrated copy of the first edition, and is full of manuscript notes by him.

13. DARWIN, FRANCIS (1848–). Charles Darwin: his life told in an autobiographical chapter, and in a selected series of his published letters. With portrait. ix, 348 p. London, 1892.

    An abridgement of the "Life and letters."

14. DARWIN, FRANCIS (1848–). More letters of Charles Darwin: a record of his work in a series of hitherto unpublished letters. In two volumes. Illustrated. London, 1903.

    Vol. I. xxiv, 494 p., [8] *pl.*

    Vol. II. viii, 508 p., [6] *pl.*

    A fine copy, beautifully extra-illustrated with 106 additional plates, of which 94 are portraits.

15. HUXLEY, THOMAS HENRY (1825–1895), *and others*. Charles Darwin. Memorial notices reprinted from "Nature." xiii, 82 p. London, 1882.

    Nature Series. Contains sketches by HUXLEY, GEORGE JOHN ROMANES (1848–1894), ARCHIBALD GEIKIE (1835–), and WILLIAM TURNER THISELTON-DYER (1843–).

16. RUTHERFORD, H. W. Catalogue of the library of Charles Darwin now in the Botany School, Cambridge. With an introduction by FRANCIS DARWIN [and a preface by

ALBERT CHARLES SEWARD]. xiv, 91 p. Cambridge, 1908.

Books and pamphlets by Charles Darwin:

(See also nos. 3, 4, 5, and 224.)

17. Extracts from letters addressed to Professor Henslow. 31 p. Cambridge, 1 D 1835.

18. Narrative of the surveying voyages of His Majesty's Ships Adventure and Beagle, between the years 1826 and 1836, describing their examination of the southern shores of South America, and the Beagle's circumnavigation of the globe. 3 vols. London, 1839. [With *plates* and *maps*.]

    Vol. I. Proceedings of the first expedition, 1826–1830, under the command of Captain P. Parker King. xxxi, 597 p.

    Darwin was not a member of this first expedition, and had nothing to do with the preparation of this volume of the report.

    Vol. II. Proceedings of the second expedition, 1831–1836, under the command of Captain Robert Fitz-Roy. xv, 695 p.

    Darwin was the Naturalist of this second expedition, but did not contribute to this volume or its appendix, which were the work of Captain King.

    Appendix to the second volume. viii, 352 p.

    Vol. III. Journal and remarks, 1832–1836. By CHARLES DARWIN. xiv, 615 p.

    This volume was also issued separately; see the following title.

19. Journal of researches into the geology and natural history of the various countries visited by H. M. S. Beagle, under the command of Captain FitzRoy, R.N., from 1832 to 1836. xiv, 615 p., *maps*. London, 1839.

    Later editions, as follows:

20. Journal of researches into the natural history and geology of the countries visited during the voyage of H.M.S. Beagle round the world, under the command of Capt. FitzRoy, R.N. Second edition, corrected, with additions. viii, 519 p. London, 1845.

    Issued in three parts, constituting "Murray's Home and Colonial Library," nos. xxii–xxiv:

Part I. (No. XXII.) p. i–viii, 1–176.
Part II. (No. XXIII.) p. 177–336.
Part III. (No. XXIV.) p. 337–519.

21. Journal of researches into the natural history and geology of the countries visited during the voyage of H.M.S. Beagle round the world, under the command of Capt. Fitz Roy, R.N. Tenth thousand. xv, 519 p. London, 1860.

22. A naturalist's voyage. Journal of researches into the natural history and geology of the countries visited during the voyage of H.M.S. 'Beagle' round the world, under the command of Capt. FitzRoy, R.N. Sixteenth thousand. x, 519 p. London, 1884.

23. A naturalist's voyage. Journal of researches into the natural history and geology of the countries visited during the voyage of H.M.S. 'Beagle' round the world, under the command of Capt. FitzRoy, R.N. With portrait. x, 519 p. London, 1889.

24. Journal of researches into the natural history and geology of the countries visited during the voyage round the world of H.M.S. 'Beagle' under the command of Captain Fitz Roy, R.N. A new edition, with illustrations by R[OBERT] T[AYLOR] PRITCHETT of places visited and objects described. xvi, 551 p. London, 1890.

25. Journal of researches into the natural history and geology of the countries visited during the voyage round the world of H.M.S. 'Beagle' under the command of Captain FitzRoy, R.N. A new edition, with illustrations by R[OBERT] T[AYLOR] PRITCHETT of places visited and objects described. xvi, 551 p. New York, 1890.

This differs from the preceding in title-page only, and is the only one of the various American editions of Darwin's works contained in the collection.

26. The zoology of the voyage of H.M.S. Beagle, under the

command of Captain FitzRoy, R. N., during the years 1832 to 1836. Edited and superintended by CHARLES DARWIN. London, 1839–43.

In 5 parts or volumes:

Part I. Fossil Mammalia, by Richard Owen. iv, 111 p., *32 pl.* London, 1840. (Geological introduction, by DARWIN, p. 3–12.)

Part II. Mammalia, by George R. Waterhouse. xi, 97 p., *34 pl.* London, 1839. (Geographical introduction, by DARWIN, p. i–v.)

Part III. Birds, by John Gould. [5], 156, [8] p., *50 pl.* London, 1841.

Part IV. Fish, by Leonard Jenyns. xvi, 172 p., *29 pl.* London, 1842.

Part V. Reptiles, by Thomas Bell. vi, 51 p., *20 pl.* London, 1843.

27. The structure and distribution of coral reefs. Being the first part of the geology of the voyage of the Beagle, under the command of Capt. FitzRoy, R.N., during the years 1832 to 1836. xii, 214 p., *3 pl.* (*maps*). London, 1842.

Later editions, as follows (see also no. 33):

28. The structure and distribution of coral reefs. Second edition, revised. xx, 278 p., *3 pl.* (*maps*). London, 1874.

29. The structure and distribution of coral reefs. Third edition, with an appendix by T[HOMAS] G[EORGE] BONNEY [(1833–)]. xx, 332 p., *3 pl.* (*maps*). London, 1889.

Preface to the third edition, by FRANCIS DARWIN, page v.

30. Geological observations on the volcanic islands visited during the voyage of H.M.S. Beagle, together with some brief notices on the geology of Australia and the Cape of Good Hope. Being the second part of the geology of the voyage of the Beagle, under the command of Capt. FitzRoy, R.N., during the years 1832 to 1836. vii, 175 p., *map*. London, 1844.

Later edition (of this and no. 32) as follows (see also no. 33):

31. Geological observations on the volcanic islands and

parts of South America visited during the voyage of H.M.S. 'Beagle.' Second edition. xiv, 647 p., *5 pl., maps.* London, 1876.

32. Geological observations on South America. Being the third part of the geology of the voyage of the Beagle, under the command of Capt. FitzRoy, R.N., during the years 1832 to 1836. viii, 279 p., *5 pl., map.* London, 1846.

    For second edition, see second edition of preceding work (see also, no. 33).

33. Geological observations on coral reefs, volcanic islands, and on South America: being the geology of the voyage of the *Beagle*, under the command of Captain FitzRoy, R.N., during the years 1832 to 1836. London, 1851.

    Consists of three parts, separately paged, which are mere re-issues of the three parts as published separately (nos. 27, 30, and 32):

    Part I. The structure and distribution of cor
    214 p., *3 pl.* (*maps*).

    Part II. Geological observations on volcanic islands. vii, 175 p., *map.*

    Part III. Geological observations on South America. viii, 279 p., *5 pl., map.*

34. A monograph on the fossil Lepadidae, or, pedunculated cirripedes of Great Britain. vi, 88 p., *5 pl.* with expl. text. London, 1851. (Palaeontographical Society, 1851.)

35. A monograph on the sub-class Cirripedia, with figures of all the species. The Lepadidae; or, pedunculated cirripedes. xii, 400 p., *10 pl.* London, 1851. (Ray Society, 1851.)

36. A monograph on the sub-class Cirripedia, with figures of all the species. The Balanidae (or sessile cirripedes); the Verrucidae, etc., etc., etc. viii, 684 p., *30 pl.* London, 1854. (Ray Society, 1854.)

37. A monograph on the fossil Balanidae and Verrucidae of Great Britain. [v,] 44, 2 p., *2 pl.* with expl. text. London, 1854. (Palaeontographical Society, 1854.)

38. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. x, 502 p. London, [24 N] 1859.

    Two copies, one in original cloth. Other editions, as follows:

39. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. [Second edition.] Fifth thousand. x, 502 p. London, [7 Ja] 1860.
Two copies, one in original cloth.

40. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Third edition, with additions and corrections. (Seventh thousand.) xix, 538 p. London, Mr 1861.

41. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Fourth edition, with additions and corrections. (Eighth thousand.) xxi, 593 p. London, Je 1866.

42. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Fifth edition, with additions and corrections. (Tenth thousand.) xxiii, 596 p. London, My 1869.

43. The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Sixth edition, with additions and corrections. (Twelfth thousand.) xxi, 458 p. London, Ja 1872.

44. The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Sixth edition, with additions and corrections to 1872. (Eighteenth thousand.) xxi, 458 p. London, 1876.

45. The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Sixth edition, with additions and corrections to 1872. (Twenty-fourth thousand.) xii, 458 p. London, 1882.

German translation, by HEINRICH GEORG BRONN (1800-1862):

46. Ueber die Entstehung der Arten im Thier- und Pflanzen-Reich durch natürliche Züchtung, oder Erhaltung der vervollkommneten Rassen im Kampfe um's Daseyn. Nach der zweiten Auflage mit einer geschichtlichen Vorrede und andern Zusätzen des Verfassers für diese deutsche Ausgabe aus dem Englischen übersetzt und mit Anmerkungen versehen von Dr. H. G. Bronn. viii, 520 p. Stuttgart, 1860.

Published in three numbers, during the first half of the year 1860.

47. Ueber die Entstehung der Arten im Thier- und Pflanzen-Reich durch natürliche Züchtung, oder Erhaltung der vervollkommneten Rassen im Kampfe um's Daseyn. Nach der dritten englischen Auflage und mit neueren Zusätzen des Verfassers für diese deutsche Ausgabe aus dem Englischen übersetzt und mit Anmerkungen versehen von Dr. H. G. Bronn. Zweite verbesserte und sehr vermehrte Auflage. Mit Darwin's Porträt in Photographie. viii, 551 p. Stuttgart, 1863.

48. Ueber die Entstehung der Arten durch natürliche Zuchtwahl, oder die Erhaltung der begünstigten Rassen im Kampfe um's Dasein. Aus dem Englischen übersetzt von H. G. Bronn. Nach der vierten englischen sehr vermehrten Ausgabe durchgesehen und berichtigt von J. Victor Carus. Dritte Auflage. Mit Darwin's Portrait. x, 571 p. Stuttgart, 1867.

French translation, by CLÉMENCE-AUGUSTE ROYER (1830–1902):

49. De l'origine des espèces, ou des lois du progrès chez les êtres organisés. Traduit en français sur la troisième édition avec l'autorisation de l'auteur par Mlle. Clémence-Auguste Royer, avec une préface et des notes du traducteur. lxiv, 712 p. Paris, 1862.

50. De l'origine des espèces par sélection naturelle, ou des lois de transformation des êtres organisés. Traduit en français avec l'autorisation de l'auteur par Clémence Royer, avec une préface et des notes du traducteur. Deuxième édition, augmentée d'après des notes de l'auteur. lix, 615 p. Paris, 1866.

French translation, by J.-J. MOULINIE:

51. L'origine des espèces au moyen de la sélection naturelle, ou la lutte pour l'existence dans la nature. Traduit sur l'invitation et avec l'autorisation de l'auteur sur les cinquième et sixième éditions anglaises. Augmentées d'un nouveau chapitre et de nombreuses notes et additions de l'auteur. Par. J.-J. Moulinie. XX, 612 p. Paris, 1873.

Russian translation, by M. FILIPPOV.

52. [The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Fully translated from the last (sixth) English edition, by M. Filippov. In three parts. These three parts constitute volume I of the collected works of C. Darwin, published under the direction of the "Scientific Review." St. Petersburg,] 18[95–]96.

In 3 parts, each issued as a free supplement to the Russian journal " Scientific Review:"

Part I. p. i–iv, 1–172. St. Petersburg, 1895.
Part II. p. 173–332. St. Petersburg, 1895.
Part III. p. i–iii, 333–539. St. Petersburg, 1896.

53. [The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. Fully translated from the last (sixth) English edition by M. Filippov. Second edition.] 402, ii p. St. Petersburg, n.d.

54. On the movements and habits of climbing plants. (From the Journal of the Linnean Society.) 118 p. London, 1865.

A separate, from Jour. Linn. Soc. Bot. 9: 1–118. 12 Je 1865 (see no. 146).

Later edition, as follows:

55. The movements and habits of climbing plants. Second edition, revised. With illustrations. viii, 208 p. London, 1875.

German translation, by JULIUS VICTOR CARUS (1823–1903):

56. Die Bewegungen und Lebensweise der kletternden Pflanzen. Aus dem Englischen übersetzt von J. Victor Carus. Mit dreizehn Holzschnitten. viii, 160 p. Stuttgart, 1876.

French translation, by RICHARD GORDON:

57. Les mouvements et les habitudes des plantes grimpantes. Ouvrage traduit de l'anglais sur la deuxième édition par le Docteur Richard Gordon. Avec treize figures dans le texte. viii, 271 p. Paris, 1877.

58. On the various contrivances by which British and foreign orchids are fertilised by insects, and on the good effects of intercrossing. With illustrations. vi, 365 p. London, [15 My] 1862.

Later edition, as follows:

59. The various contrivances by which orchids are fertilised by insects. Second edition, revised. With illustrations. xvi, 300 p. London, 1877.

The half-title reads: "On the fertilisation of orchids by insects, &c. &c."

German translation, by HEINRICH GEORG BRONN (1800–1862):

60. Ueber die Einrichtungen zur Befruchtung Britischer und ausländischer Orchideen durch Insekten, und über die günstigen Erfolge der Wechselbefruchtung. Mit Nachträgen und Verbesserungen des Verfassers aus dem Englischen übersetzt von H. G. Bronn. Mit den 34 Holzschnitten des Originals. vi, 227 p. Stuttgart, 1862.

French translation, by LOUIS RÉROLLE:

61. De la fécondation des Orchidées par les insectes et des bons résultats du croisement. Traduit de l'anglais par L. Rérolle. Avec 34 gravures. iii, 352 p. Paris, 1870.

62. The variation of animals and plants under domestication. With illustrations. 2 vols. London, [30 Ja] 1868.
Vol. I. viii, 411 p.
Vol. II. viii, 486 p.

Later edition, as follows:

63. The variation of animals and plants under domestication. Second edition, revised. Fourth thousand. 2 vols. London, 1875.
Vol. I. xiv, 473 p.
Vol. II. x, 495 p.

64. The descent of man, and selection in relation to sex. With illustrations. 2 vols. London, [24 F] 1871.

Two copies, one in original cloth.

Vol. I. viii, 423 p.
Vol. II. ix, 475 p.

Later editions, as follows:

65. The descent of man, and selection in relation to sex. With illustrations. Seventh thousand. 2 vols. London, 1871.

Vol. I, p. 297–299 are wholly rewritten in this issue.

Vol. I. viii, 423 p.
Vol. II. viii, 475 p.

66. The descent of man, and selection in relation to sex. Second edition, revised and augmented. With illustrations. Tenth thousand. xvi, 688 p. London, [S] 1874.

67. The descent of man, and selection in relation to sex. Second edition, revised and augmented. (23rd thousand.) With illustrations. 2 vols. London, 1891.
Vol. I. xvii, 507 p.
Vol. II. viii, 528 p.

Italian translation, by MICHELE LESSONA (1823–):

68. L'origine dell'uomo e la scelta in rapporto col sesso. Prima traduzione italiana col consenso dell'autore del Professore Michele Lessona. Opera adorna di molte incisione intercalate nel

testo. 672 p. Torino e Napoli, 1871 [1872 on the original paper cover].

69. The expression of the emotions in man and animals. With photographic and other illustrations. vi, 374 p. London, [N] 1872.

70. Insectivorous plants. With illustrations. x, 462 p. London, [2 Jl] 1875.

German translation, by JULIUS VICTOR CARUS (1823–1903):

71. Insectenfressende Pflanzen. Aus dem Englischen übersetzt von J. Victor Carus. Mit dreiszig Holzschnitten. viii, 412 p. Stuttgart, 1876.

72. The effects of cross and self fertilisation in the vegetable kingdom. viii, 482 p. London, [10 N] 1876.

Later edition, as follows:

73. The effects of cross and self fertilisation in the vegetable kingdom. Second edition. viii, 487 p. London, 1888.

74. The different forms of flowers on plants of the same species. With illustrations. viii, 352 p. London, [Jl] 1877.

German translation, by JULIUS VICTOR CARUS (1823–1903):

75. Die verschiedenen Blüthenformen an Pflanzen der nämlichen Art. Aus dem Englischen übersetzt von J. Victor Carus. Mit 15 Holzschnitten. viii, 304 p. Stuttgart, 1877.

French translation, by ÉDOUARD MARIE HECKEL (1843–):

76. Des différentes formes de fleurs dans les plantes de la même espèce. Ouvrage traduit de l'anglais avec autorisation de l'auteur et annoté par le Dr. Édouard Heckel. Précédé d'une Préface analytique du Prof. Coutance. Avec quinze gravures dans le texte. xxxvi, 361 p. Paris, 1878.

77. The power of movement in plants. By CHARLES DARWIN, assisted by FRANCIS DARWIN. With illustrations. x, 592 p. London, [6 N] 1880.

German translation, by JULIUS VICTOR CARUS (1823–1903):

78. Die Bewegungsvermögen der Pflanzen. Aus dem Englischen übersetzt von J. Victor Carus. Mit

196 Holzschnitten. Zweite Auflage. ix, 506 p. Stuttgart, 1899.

79. The formation of vegetable mould, through the action of worms, with observations on their habits. With illustrations. vii, 326 p. London, [10 O] 1881.

Later edition, as follows:

80. The formation of vegetable mould, through the action of worms, with observations on their habits. With illustrations. Sixth thousand (corrected). vii, 328 p. London, 1882.

German translation, by JULIUS VICTOR CARUS (1823–1903):

81. Die Bildung der Ackererde durch die Thätigkeit der Würmer, mit Beobachtung über deren Lebenweise. Aus dem Englischen übersetzt von J. Victor Carus. Mit 15 Holzschnitten. Mit Zusätzen nach dem 5. Tausend des Originals. vii, 184 p. Stuttgart, 1882.

82. Gesammelte kleinere Schriften. Ein Supplement zu seinen grösseren Werken. Herausgegeben und mit Erläuterungen versehen von Dr. Ernst Krause. viii, 278 p. Leipzig, 1886.

Darwinistische Schriften. No. 17.

Another issue:

83. Gesammelte kleinere Schriften. Ein Supplement zu seinen grösseren Werken. Herausgegeben und mit Erläuterungen versehen von Dr. Ernst Krause. viii, 278 p. Leipzig, [1887].

Darwinistische Schriften. Neue billige Ausgabe. Zweite Folge. Band VII.

84. Miscellaneous and hitherto uncollected writings. Compiled by Charles F. Cox. 2 vols. New York, 1904.

These two unique volumes, with specially printed title-pages, but not yet bound, comprise a complete series of Darwin's miscellaneous writings, in their original form, as listed elsewhere in this catalogue. There are very numerous examples of beautiful inlay work, resorted to in order to bring the various items to a page of standard size. Volume I comprises papers published from 1835 to 1862; volume II, from 1863 to 1882, with the addition of certain posthumous ones.

85. The foundations of the Origin of species, a sketch written in 1842. Edited by his son, Francis Darwin. [With a portrait.] xxii, 53 p. Cambridge, 1909.
86. The foundations of the Origin of species. Two essays written in 1842 and 1844. Edited by his son, Francis Darwin. [With a portrait.] xxx, 263 p. Cambridge, 1909.

Papers contributed by Charles Darwin to periodical literature:

Proceedings of the Geological Society of London (1836–1842):

87. Geological notes made during a survey of the east and west coasts of South America in the years 1832, 1833, 1834, and 1835, with an account of a transverse section of the Cordilleras of the Andes between Valparaiso and Mendoza. Proc. Geol. Soc. Lond. **2**: 210–212. 1836.

    Credited to "F." Darwin, but the error corrected in the volume-index.

88. Observations of proofs of recent elevation on the coast of Chili, made during the survey of His Majesty's ship Beagle, commanded by Capt. Fitzroy, R.N. Proc. Geol. Soc. Lond. **2**: 446 449. 1837.
89. A sketch of the deposits containing extinct Mammalia in the neighbourhood of the Plata. Proc. Geol. Soc. Lond. **2**: 542–544. 1838.
90. On certain areas of elevation and subsidence in the Pacific and Indian oceans, as deduced from the study of coral formations. Proc. Geol. Soc. Lond. **2**: 552–554. 1838.
91. On the formation of mould. Proc. Geol. Soc. Lond. **2**: 574–576. 1838.

    Cf. no. 100.

92. On the connexion of certain volcanic phaenomena, and on the formation of mountain-chains and volcanos, as the effects of continental elevations. Proc. Geol. Soc. Lond. **2**: 654–660. 1838.

    Cf. no. 101.

93. On the distribution of the erratic boulders, and on the contemporaneous unstratified deposits of South America. Proc. Geol. Soc. Lond. **3**: 425–430. 1842.

    Cf. no. 102.

Proceedings of the Zoological Society of London (1837–1882):

94. [Notes upon the *Rhea americana*.] Proc. Zool. Soc. Lond. **5**: 35, 36. 1837.

95. [Remarks upon goldfinches.] Proc. Zool. Soc. Lond. **5**: 49. 1837.

96. Note on the habits of the Pampas woodpecker (*Colaptes campestris*). Proc. Zool. Soc. Lond. **1870**: 705, 706. 1871.

97. [Preliminary notice to a paper by W. VAN DYCK on the modification of a race of Syrian street-dogs by means of sexual selection.] Proc. Zool. Soc. Lond. **1882**: 367–369. 1 Au 1882.

Transactions of the Geological Society of London (1838–1842):

98. [On the boring of limestone by annelides, and observations on the Faxoe coral limestone.] Trans. Geol. Soc. Lond. II. **5**: 249. 1838.

Footnote in a paper by CHARLES LYELL (1797 1875), credited to Darwin in the volume-index.

99. [On the growth and disintegration of coral, and on the excrement of *Sparus*.] Trans. Geol. Soc. Lond. II. **5**: 252. 1838.

Another footnote in the same paper.

100. On the formation of mould. Trans. Geol. Soc. Lond. II. **5**: 505–509. 1840.

Cf. no. 91.

101. On the connexion of certain volcanic phenomena in South America; and on the formation of mountain chains and volcanos, as the effect of the same power by which continents are elevated. Trans. Geol. Soc. Lond. II. **5**: 601–631. *pl. 49*. 1840.

Cf. no. 92.

102. On the distribution of erratic boulders and on the contemporaneous unstratified deposits of South America. Trans. Geol. Soc. Lond. II. **6**: 415 431. *pl. 40*. 1842.

Cf. no. 93.

Journal of the Royal Geographical Society of London (1839–1842):

103. Note on a rock seen on an iceberg in 61° South Latitude. Jour. Roy. Geog. Soc. **9**: 528, 529. 1839.

104. [Review and abstract, by JULIAN R. JACKSON, of] The structure and distribution of coral reefs. Jour. Roy. Geog. Soc. **12**: 115–120. 1842.

Philosophical Transactions of the Royal Society of London (1839):

105. Observations on the parallel roads of Glen Roy, and of other parts of Lochaber in Scotland, with an attempt to prove that they are of marine origin. Phil. Trans. Roy. Soc. **1839**: 39–81. *pl. 1, 2.* 1839.

London, Edinburgh and Dublin Philosophical Magazine (1841–1855):

106. On a remarkable bar of sandstone off Pernambuco, on the coast of Brazil. Phil. Mag. III. **19**: 257–260. O 1841.

107. Notes on the effects produced by the ancient glaciers of Caernarvonshire, and on the boulders transported by floating ice. Phil. Mag. III. **21**: 180–188. S 1842.

Cf. no. 109.

108. On the power of icebergs to make rectilinear, uniformly-directed grooves across a submarine undulatory surface. Phil. Mag. IV. **10**: 96–98. Au 1855.

Edinburgh New Philosophical Journal (1842–1843):

109. Notes on the effects produced by the ancient glaciers of Caernarvonshire, and on the boulders transported by floating ice. Edinb. New Phil. Jour. **33**: 352–363. O 1842.

Reprinted from the Philosophical Magazine (see no. 107).

110. Remarks on the preceding paper [MACLAREN, CHARLES. On coral islands and reefs, as described by Mr. Darwin, pages 33–47]. Edinb. New Phil. Jour. **34**: 47–50. Ja 1843.

Annals and Magazine of Natural History (1844–1869):

111. Observations on the structure and propagation of the genus *Sagitta*. Ann. Mag. Nat. Hist. **13**: 1–6. *pl. 1*. Ja 1844.

112. Brief descriptions of several terrestrial Planariae, and of some remarkable marine species, with an account of their habits. Ann. Mag. Nat. Hist. **14**: 241–251. *pl. 5*. O 1844.

113. [Review, not signed, of] A natural history of the Mammalia, by G. R. Waterhouse. Ann. Mag. Nat. Hist. **19**: 53–56. Ja 1847.

114. On the agency of bees in the fertilization of papilionaceous flowers, and on the crossing of kidney beans. Ann. Mag. Nat. Hist. III. **2**: 459–465. D 1858.

Reprinted from the Gardener's Chronicle (see no. 129).

115. Notes on the fertilization of orchids. Ann. Mag. Nat. Hist. IV. **4**: 141–159. S 1869.

Quarterly Journal of the Geological Society of London (1846–1863):

116. An account of the fine dust which often falls on vessels in the Atlantic ocean. Quart. Jour. Geol. Soc. Lond. **2**: 26–30. 1 F 1846.

117. Origin of saliferous deposits. Salt lakes of Patagonia and La Plata. Quart. Jour. Geol. Soc. Lond. **2**: 127, 128. 1 My 1846.

118. On the geology of the Falkland islands. Quart. Jour. Geol. Soc. Lond. **2**: 267–274. 1 N 1846.

119. On the transportal of erratic boulders from a lower to a higher level. Quart. Jour. Geol. Soc. Lond. **4**: 315–323. 1 N 1848.

120. On British fossil Lepadidae. [Abstract.] Quart. Jour. Geol. Soc. Lond. **6**: 439, 440. 1 N 1850.

121. On the thickness of the Pampean formation, near Buenos Ayres. Quart. Jour. Geol. Soc. Lond. **19**: 68–71. 1 F 1863.

Proceedings of the Royal Society of Edinburgh (1851):

122. Extracts from letters to the General Secretary, on the analogy of the structure of some volcanic rocks with that of glaciers. Proc. Roy. Soc. Edinb. **2**: 17, 18. 1851.

Gardener's Chronicle (1855–1877):

123. Does sea-water kill seeds? Gard. Chron. **1855**: 242. 14 Ap 1855.
124. Does sea-water kill seeds? Gard. Chron. **1855**: 356, 357. 26 My 1855.
125. Vitality of seeds. Gard. Chron. **1855**: 758. 17 N 1855.
126. Effect of salt-water on the germination of seeds. Gard. Chron. **1855**: 773. 24 N 1855.
127. Effect of salt water on the germination of seeds. Gard. Chron. **1855**: 789. 1 D 1855.
128. Bees and fertilisation of kidney beans. Gard. Chron. **1857**: 725. 24 O 1857.
129. On the agency of bees in the fertilisation of papilionaceous flowers, and on the crossing of kidney beans. Gard. Chron. **1858**: 828, 829. 13 N 1858.

Cf. no. 114.

130. Cross-bred plants. Gard. Chron. **1860**: 49. 21 Ja 1860.
131. Natural selection. Gard. Chron. **1860**: 362, 363. 21 Ap 1860.
132. Fertilisation of British orchids by insect agency. Gard. Chron. **1860**: 528. 9 Je 1860.

Cf. no. 152.

133. Note on the achenia of *Pumilio argyrolepis*. Gard. Chron. **1861**: 4, 5. 5 Ja 1861.
134. Fertilisation of vincas. Gard. Chron. **1861**: 552. 15 Je 1861.
135. Vincas. Gard. Chron. **1861**: 831, 832. 14 S 1861.
136. [Letter.] Gard. Chron. **1863**: 675. 18 Jl 1863.
137. Fertilisation of *Leschenaultia*. Gard. Chron. **1871**: 1166. 9 S 1871.
138. The scarcity of holly berries and bees. Gard. Chron. **II. 7**: 83. 20 Ja 1877.

139. Fertilisation of plants. Gard. Chron. II. **7**: 246. 24 F 1877.

Journal of the Proceedings of the Linnean Society (1856–1882):

140. On the action of sea-water on the germination of seeds. Jour. Linn. Soc. Bot. **1**: 130–140. 1 N 1856.

141. (With ALFRED RUSSEL WALLACE.) On the tendency of species to form varieties; and on the perpetuation of varieties and species by natural means of selection. Jour. Linn. Soc. Zool. **3**: 45–62. 20 Au 1858.

Darwin's contributions to this paper were: I. Extract from an unpublished work on species by C. Darwin, Esq., consisting of a portion of a chapter entitled, "On the variation of organic beings in a state of nature; on the natural means of selection; on the comparison of domestic races and true species," pages 42 50. II. Abstract of a letter from C. Darwin, Esq., to Prof. Asa Gray, Boston, U. S., dated Down, September 5th, 1857, pages 50–53.

142. On the two forms, or dimorphic condition, in the species of *Primula*, and on their remarkable sexual relations. Jour. Linn. Soc. Bot. **6**: 77–96. 1 Mr 1862.

143. On the three remarkable sexual forms of *Catasetum tridentatum*, an orchid in the possession of the Linnean Society. Jour. Linn. Soc. Bot. **6**: 151–157. 1 N 1862.

144. On the existence of two forms, and on their reciprocal sexual relation, in several species of the genus *Linum*. Jour. Linn. Soc. Bot. **7**: 69–83. 13 My 1863.

145. On the sexual relations of the three forms of *Lythrum Salicaria*. Jour. Linn. Soc. Bot. **8**: 169–196. 12 D 1864.

146. On the movements and habits of climbing plants. Jour. Linn. Soc. Bot. **9**: 1–118. 12 Je 1865.

For separate, see no. 54.

147. [On the common Broom.] Jour. Linn. Soc. Bot. **9**: 358. 29 N 1866.

148. On the character and hybrid-like nature of the offspring from the illegitimate unions of dimorphic and trimorphic plants. Jour. Linn. Soc. Bot. **10**: 393–437. 23 Je 1868.

149. On the specific difference between *Primula veris* Brit. Fl. (var. *officinalis* of Linn.), *P. vulgaris* Brit. Fl. (var.

acaulis Linn.), and *P. elatior* Jacq.; and on the hybrid nature of the common oxlip. With supplementary remarks on naturally-produced hybrids in the genus *Verbascum*. Jour. Linn. Soc. Bot. **10**: 437–454. 23 Je 1868.

150. The action of carbonate of ammonia on the roots of certain plants. Jour. Linn. Soc. Bot. **19**: 239–261. 26 Je 1882.
151. The action of carbonate of ammonia on chlorophyll-bodies. Jour. Linn. Soc. Bot. **19**: 262–284. 28 Au 1882.

Entomologist's Weekly Intelligencer (*1860*):

152. On the fertilization of British orchids by insect agency. Entom. Weekly Intell. **8**: 93, 94. 23 Je 1860; 102, 103. 30 Je 1860.

Reprinted from the Gardener's Chronicle (see no. 132).

Natural History Review (*1862–1863*):

153. On dimorphism in *Primula*. [Abstract, from the Journal of the Linnean Society.] Nat. Hist. Rev. **1862**: 118. Ja 1862.
154. On the so-called "auditory-sac" of cirripedes. Nat. Hist. Rev. **1863**: 115, 116. Ja 1863.
155. [Review, not signed, of] Contributions to an insect fauna of the Amazon valley. By Henry Walter Bates. Nat. Hist. Rev. **1863**: 219–224. Ap 1863.

Athenaeum (*1863*):

156. The doctrine of heterogeny and modification of species. Athenaeum **1863**[1]: 554, 555. 25 Ap 1863.
157. Origin of species. Athenaeum **1863**[1]: 617. 9 My 1863.
158. Origin of species. Athenaeum **1869**[2]: 82. 17 Jl 1869.

Nature (*1869–1891*):

159. The fertilisation of winter-flowering plants. Nature **1**: 85. 18 N 1869.
160. Pangenesis. Nature **3**: 502, 503. 27 Ap 1871.
161. A new view of Darwinism. Nature **4**: 180, 181. 6 Jl 1871.

162. Bree on Darwinism. Nature **6**: 279. 8 Au 1872.
163. Inherited instinct. Nature **7**: 281. 13 F 1873.
164. Perception in the lower animals. Nature 7: 360. 13 Mr 1873.
165. Origin of certain instincts. Nature **7**: 417, 418. 3 Ap 1873.
166. Habits of ants. Nature **8**: 244. 24 Jl 1873.
167. On the males and complimental males of certain cirripedes, and on rudimentary structures. Nature **8**: 431, 432. 25 S 1873.
168. Recent researches on termites and honey-bees. Nature **9**: 308, 309. 19 F 1874.
169. Fertilisation of the Fumariaceae. Nature **9**: 460. 16 Ap 1874.
170. Flowers of the primrose destroyed by birds. Nature **9**: 482. 23 Ap 1874.
171. Flowers of the primrose destroyed by birds. Nature **10**: 24, 25. 14 My 1874.
172. Cherry blossoms. Nature **14**: 28. 11 My 1876.
173. Sexual selection in relation to monkeys. Nature **15**: 18, 19. 2 N 1876.
174. Fritz Müller on flowers and insects. Nature **17**: 78. 29 N 1877.
175. Transplantation of shells. Nature **18**: 120, 121. 30 My 1878.
176. Fritz Müller on a frog having eggs on its back; on the abortion of the hairs on the legs of certain caddis-flies, &c. Nature **19**: 462, 463. 20 Mr 1879.
177. Rats and water-casks. Nature **19**: 481. 27 Mr 1879.
178. Fertility of hybrids from the common and Chinese goose. Nature **21**: 207. 1 Ja 1880.
179. The sexual colours of certain butterflies. Nature **21**: 237. 8 Ja 1880.
180. The Omori shell mounds. Nature **21**: 561. 15 Ap 1880.
181. Sir Wyville Thomson and natural selection. Nature **23**: 32. 11 N 1880.
182. Black sheep. Nature **23**: 193. 30 D 1880.
183. Movements of plants. Nature **23**: 409. 3 Mr 1881.

184. The movements of leaves. Nature **23**: 603, 604. 28 Ap 1881.

185. Inheritance. Nature **24**: 257. 21 Jl 1881.

186. Leaves injured at night by free radiation. Nature **24**: 459. 15 S 1881.

187. The parasitic habits of *Molothrus*. Nature **25**: 51, 52. 17 N 1881.

188. On the dispersal of freshwater bivalves. Nature **25**: 529, 530. 6 Ap 1882.

189. [Abstract of a posthumous paper on instinct.] Nature **29**: 128, 129. 6 D 1883.

190. [Letter to the Duke of Argyll on the unity of the human race.] Nature **43**: 415. 5 Mr 1891.

191. [Letter to George Bentham on the multiple origin of races.] Nature **43**: 535, 536. 9 Ap 1891.

Index, Toledo, Ohio (1871):

192. [Quotation from a private latter, the writer's name not stated.] Index **2**: 196. 24 Je 1871.

193. [Quotation from another letter, and authorship of this and the preceding credited to Charles Darwin.] Index **2**: 404. 23 D 1871.

These two letters were in approval of a pamphlet, a later edition of which is included in the collection:

ABBOT, FRANCIS ELLINGWOOD (1836–1903). Truths for the times. Second edition. 15 p. Toledo, Ohio, 1872. (The Index Tracts No. 1.)

Mind (1877):

194. A biographical sketch of an infant. Mind **2**: 285–294. Jl 1877.

British Medical Journal (1881):

195. [Extract from a letter to Dr. Lauder Brunton.] Brit. Med. Jour. 1881^2: 917. 3 D 1881.

Manuscript letters of Charles Darwin:

196. A collection of 12 letters to Albany Hancock (1806–1873), concerning the discovery of the complimental male cirripedes, from 1849 to 1854.

197. A collection of 136 letters to William Bernhard Tegetmeier (1816–1912), during a period of more than twenty-five years, from 1855 to 1881. Of this number, 112 are autograph letters, signed.
198. A miscellaneous collection of 29 letters written to various persons at different times. Of these, 7 have been inserted in the extra-illustrated copy of the "Life and letters" (see no. 11).

Other memorials of Charles Darwin:

199. Bronze statuette, seated, 14 inches high, on a base 9×12 inches; signed "I. Montford."
200. Photograph from life, made by Maull & Fox, about 1854; print from repaired negative; framed.
201. Wood-cut from Harper's Magazine, October 1884, from the photograph by Maull & Fox; in passe-partout.
202. Wood-engraving, by Gustav Kruell (1843–1907), after the photograph by Maull & Fox; engraved in 1889, and the block destroyed; framed.
203. Photogravure, for the Open Court, 1901, after the photograph by Maull & Fox; in passe-partout.
204. Steel-engraving, by Charles Henry Jeens (1827–1879), for Nature, 4 June 1874; after a photograph by O. J. Rejlander, about 1870; framed.
205. Wood-cut from the Graphic, 27 March 1875, from the photograph by O. J. Rejlander; not mounted.
206. Wood-cut from the Graphic, 29 April 1882 (reprinted from the Graphic of 27 March 1875); in passe-partout.
207. Wood-engraving, by Gustav Kruell (1843–1907), after a photograph from life by Elliott & Fry, in 1881; engraved in 1889; signed proof; framed.
208. Engraving by Samuel Hollyer (1826–), said to be from a photograph by Elliott & Fry, in 1881, but not the same photograph as the preceding, unless very freely altered; in passe-partout.

Books and pamphlets upon Darwinism and related topics:

209. Bree, Charles Robert. An exposition of the fallacies in the hypothesis of Mr. Darwin. xviii, 418 p. London, 1872

210. CHAMBERLIN, THOMAS CHROWDER (1843–), *ed.* Fifty years of Darwinism. Modern aspects of evolution. Centennial addresses in honor of Charles Darwin, before the American Association for the Advancement of Science, Baltimore, Friday, January 1, 1909. v, 274 p., *5 pl.* New York, 1909.

Contains addresses by WILLIAM ERNEST CASTLE (1867–), JOHN MERLE COULTER (1851–), CHARLES BENEDICT DAVENPORT (1866–), CARL H. EIGENMANN (1863-), GRANVILLE STANLEY HALL (1846–), DAVID STARR JORDAN (1851–), DANIEL TREMBLY MACDOUGAL (1865–), HENRY FAIRFIELD OSBORN (1857–), EDWARD BAGNALL POULTON (1856–), and EDMUND BEECHER WILSON (1856–).

211. [CHAMBERS, ROBERT (1802–1871)]. Vestiges of the natural history of creation. Tenth edition. With extensive additions and emendations, and illustrated by numerous engravings on wood. xii, 325, lxvii p. London, 1853.

212. [COUES, ELIOTT (1842–1899).] The daemon of Darwin. By the author of "Biogen." 64 p. Boston, 1885.

213. GEIKIE, ARCHIBALD (1835–). Charles Darwin as geologist. The Rede Lecture given at the Darwin Centennial Commemoration on 24 June 1909. 91 p. Cambridge, 1909.

214. GRAY, ASA (1810–1888). Darwiniana: essays and reviews pertaining to Darwinism. xii, 396 p. New York, 1876.

215. GUENTHER, CONRAD. Darwinism and the problems of life. A study of familiar animal life. Translated from the third edition by JOSEPH MCCABE [(1867–)]. 436 p. London, 1906.

216. HUTTON, FREDERICK WOLLASTON (1836–1905). Darwinism and Lamarckism, old and new. Four lectures. x, 226 p. New York and London, 1899.

217. HUXLEY, THOMAS HENRY (1825–1895). Darwiniana. Essays. x, 475 p. London, [1893, reprinted] 1902.

218. HUXLEY, THOMAS HENRY (1825-1895). Time and life: Darwin's "Origin of species." (Reprinted from "Macmillan's Magazine," 1859.) 15 p. Bedford, 1906.

219. KELLOGG, VERNON LYMAN (1867–). Darwinism to-day: a discussion of present-day scientific criticism of the

Darwinian selection theories, together with a brief account of the principal other proposed auxiliary and alternative theories of species-forming. xii, 403 p. New York, 1907.

220. KIDD, WALTER. Use-inheritance illustrated by the direction of hair on the bodies of animals. 47 p. London, 1901.

221. KRAUSE, ERNST LUDWIG (1839–1903). Charles Darwin und sein Verhältnis zu Deutschland. Mit zahlreichen, bisher ungedruckten Briefen Darwins, zwei Porträts, Handschriftprobe u.s.w. in Lichtdruck. vii, 236 p. Leipzig, 1885.

Darwinische Schriften. No. 16.

Another issue:

222. Charles Darwin und sein Verhältnis zu Deutschland. Mit zahlreichen, bisher ungedruckten Briefen Darwins, zwei Porträts, Handschriftprobe u.s.w. in Lichtdruck. vii, 236 p. Leipzig, [1887].

[Darwinistische Schriften. Neue billige Ausgabe. Zweite Folge. Band VI.]

223. MÜLLER, FRITZ [JOHANN FRIEDRICH THEODOR] (1822–1897). Facts and arguments for Darwin. With additions by the author. Translated from the German by W[ILLIAM] S[WEETLAND] DALLAS [(1824–1890)]. With illustrations. vii, 144 p. London, 1869.

224. MÜLLER, HEINRICH LUDWIG HERMANN (1829–1883). The fertilisation of flowers. Translated and edited by D'ARCY W[ENTWORTH] THOMPSON [(1860–)]. With a preface by CHARLES DARWIN. With illustrations. xii, 669 p. London, 1883.

225. OSBORN, HENRY FAIRFIELD (1857–). From the Greeks to Darwin: an outline of the development of the evolution idea. x, 259 p. New York, [Jl] 1894.

Columbia University Biological Series. I.

Another issue:

226. From the Greeks to Darwin: an outline of the development of the evolution idea. x, 259 p. New York, 1908.

227. POULTON, EDWARD BAGNALL (1856–). Charles Darwin and the theory of natural selection. 224 p. New York, 1896.

The Century Science Series.

228. POULTON, EDWARD BAGNALL (1856–). Charles Darwin and the Origin of species. Addresses, etc., in America and England, in the year of the two anniversaries. Published Nov. 24, 1909, being the fiftieth anniversary of the publication of "The origin of species." xvi, 302 p. London, 1909.

229. ROMANES, GEORGE JOHN (1848–1894). Darwin, and after Darwin: an exposition of the Darwinian theory and a discussion of post-Darwinian questions. 3 vols. Chicago, 1892–97.

I. The Darwinian theory. vii, 460 p. 1892.

II. Post-Darwinian questions: heredity and utility. xi, 344 p. 1895.

III. Post-Darwinian questions: isolation and physiological selection. viii, 181 p. 1897.

The second and third volumes were edited after the author's death by CONWY LLOYD MORGAN (1852–).

230. SEWARD, ALBERT CHARLES (1863–), *ed.* Darwin and modern science. Essays in commemoration of the centenary of the birth of Charles Darwin and of the fiftieth anniversary of the publication of *The origin of species.* xvii, 595 p. Cambridge, 1909.

Contains essays by WILLIAM BATESON (1861–), C. BOUGLÉ, JOHN BAGNELL BURY (1861–), FRANCIS DARWIN (1848–), GEORGE HOWARD DARWIN (1845–), HUGO DE VRIES (1848–), WILLIAM TURNER THISELTON-DYER (1843–), JAMES GEORGE FRAZER (1854–), HANS FRIEDRICH GADOW (1855–), PETER GILES, KARL EBERHARD GOEBEL (1855–), ERNST HEINRICH HAECKEL (1834–), JANE ELLEN HARRISON (1850–), HAROLD HÖFFDING (1843–), JOSEPH DALTON HOOKER (1817–1911), JOHN WESLEY JUDD (1840–), GEORG KLEBS (1857–), JACQUES LOEB (1859–), CONWY LLOYD MORGAN (1852–), EDWARD BAGNALL POULTON (1856–), GUSTAV ALBERT SCHWALBE (1844–), DUKINFIELD HENRY SCOTT (1854–), WILLIAM BERRYMAN SCOTT (1858–), ADAM SEDGWICK, EDUARD STRASBURGER (1844-1912), JOHN ARTHUR THOMSON (1861–), PHILIP NAPIER WAGGETT, FRIEDRICH LEOPOLD AUGUST WEISMANN (1834–), and WILLIAM CECIL DAMPIER WHETHAM (1867–).

231. SPENCER, HERBERT (1820–1903). The factors of organic evolution. Reprinted, with additions, from *The Nineteenth Century*. vi, 76 p. New York, 1887.

232. WALLACE, ALFRED RUSSEL (1822–). Darwinism: an exposition of the theory of natural selection, with some of its applications. With map and illustrations. xvi, 494 p. London, 1889.

233. WRIGHT, CHAUNCEY (1830–1875). Darwinism: being an examination of Mr. St. George Mivart's "Genesis of species." (Reprinted from the "North American Review," July, 1871, with additions.) 46 p. London, 1871.

234. *Anonymous* ("A field naturalist"). The primrose and Darwinism. xiii, 233 p. New York and London, 1902.

Besides the above items (nos. 209–234), there are various pamphlets relating to the Darwin celebrations of 1909, and magazine articles relating to Darwinism and the Darwin celebrations.

George Howard Darwin (1845–)

Son of Charles Robert Darwin

235. Scientific Papers. 4 vols. Cambridge, 1907–11.

Volume I. Oceanic tides and lunar disturbance of gravity. xiv, 463 p. 1907.

Volume II. Tidal friction and cosmogeny. xvi, 516 p. 1908.

Volume III. Figures of equilibrium of rotating liquid and geophysical investigations. xvi, 527 p. 1910.

Volume IV. Periodic orbits and miscellaneous papers. xviii, 592 p. 1911.

Francis Darwin (1848–)

Son of Charles Robert Darwin

(See nos. 11–14, 16, 29, 77, 85, and 86.)

Leonard Darwin (1850–)

Son of Charles Robert Darwin

236. Municipal trade: the advantages and disadvantages resulting from the substitution of representative bodies for private proprietors in the management of industrial undertakings. xxiv, 464 p. London, 1903.

JOHN HENDLEY BARNHART.

WINTER PROTECTION OF PLANTS

This is a subject of great importance, if we wish to have fine vigorous specimens instead of those which show in every way the effects of their struggle with an uncongenial environment. This desirable result may be attained in two ways: by the selection of suitable plants, and by affording protection from adverse circumstances. In the first place then by proper initial care, the old adage applying here as elsewhere, "an ounce of prevention is worth a pound of cure." So let us select for our environment plants which experience has shown will thrive under given conditions. Let this be our first way of affording winter protection, and by adopting this method the number of plants which will need additional protection will be reduced to a minimum. The general principle may be laid down that plants which are forced out of their natural environment are weakened to that extent in their struggle for existence. For instance, if plants which delight in a wet or swampy place are placed in a dry location, just so much more energy must be expended in an effort to adapt themselves to unaccustomed conditions, with a commensurate reduction along other lines, and consequently they are not as able to survive the winter as others where the requirements are more nearly normal. The same holds true for plants which prefer the protection afforded in group association. Remove them from this condition and place them, as solitary individuals, in a wind-swept location and you court disaster. Many plants are partial to valleys, some to shaded situations, while others do best only in the direct sunlight, and if you wish the best results you must at least approximate the individual requirements of the plant.

The nature of the soil has much to do with this matter of protection. Some plants require an acid soil, others that of an alkaline nature. Heavy clay soils, retentive of moisture, are best adapted to some, while others prefer light sandy soils where good and quick drainage is assured.

Atmospheric conditions form another factor which we must consider in our selection. If plants live in a locality where the

rainfall is heavy and the atmosphere charged with humidity, it is almost impossible to transplant them to a location where the air is dry, and expect satisfactory results, and the case holds vice versa. This is especially marked in the cultivation about New York of the conifers which find their home west of the Cascade Mountains in our northwest country, an area of heavy precipitation. The hot dry summers here are a severe tax upon them, resulting in dwarfing, or to such a reduction in vigor as to render them unable to withstand the rigors of our winters.

The matter of temperature must also be carefully considered. Other things being equal, an average lower temperature than that to which a plant is accustomed may be a controlling factor between perfect hardiness and the necessity for partial protection. In many cases, if the variation is not too extreme, this may be compensated for by placing a given plant in an especially protected situation, where the winds of winter are shut out by surrounding trees or other wind-breaks.

Many plants live in regions where there is a continuous snow-blanket which serves as a protection against sudden changes in soil temperature. Plants from regions of this kind, although the air temperature may be much lower, suffer, when cultivated in a milder climate, from this lack of a perpetual snow-blanket, the alternate thawing and freezing, with the resultant heaving, proving disastrous in many cases. Under such circumstances a heavy top-dressing will accomplish much, taking the place in part of the heavy snow-blanket to which they are accustomed.

In the selection of a species of wide geographic range care should be taken to ascertain from what particular section your plants were derived. Those obtained from a humid warm locality within the range of a species might prove entirely unsatisfactory, while others secured in a drier and colder section would be hardy. This is particularly true of conifers. You must look for a hardy strain, secured from that particular region which more nearly resembles your own. The Douglas spruce, *Pseudotsuga mucronata*, is an example of this. Plants derived from the humid region west of the Cascade Mountains in Washington would stand little chance of living in the comparatively

dry conditions of New York, while those obtained from the drier regions east of the mountains in the same state would meet with a more congenial environment here.

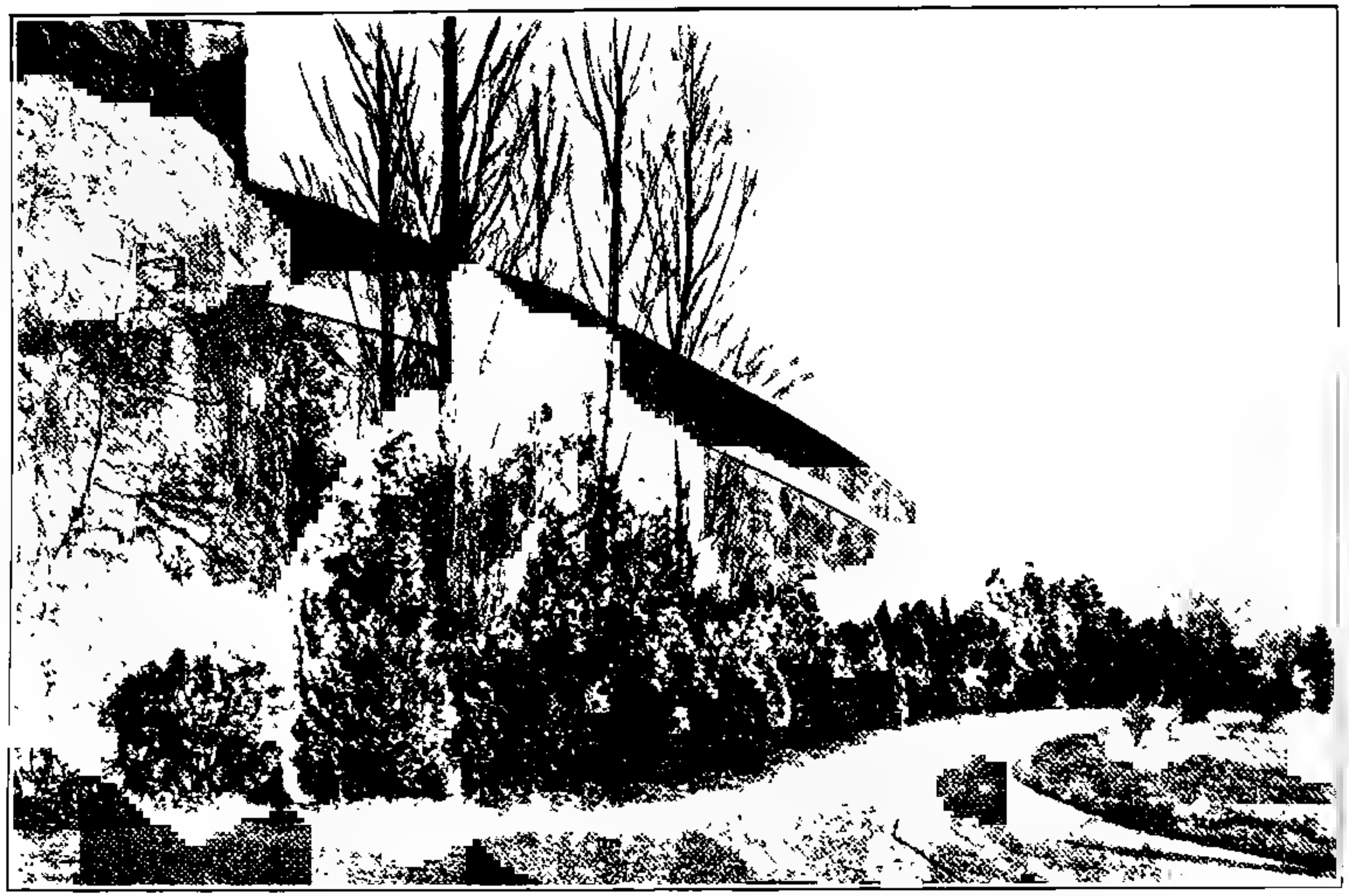
There are plants, of course, more plastic in their nature, and such can adapt themselves to a variety of conditions, but these are apt to partake of the nature of weeds, simply because they can fit themselves to so many different circumstances. Many of our most prized plants in cultivation, however, are very exacting in their requirements, and will only thrive to perfection when the environment exactly suits their needs.

In other words, there is a perpetual struggle going on between the forces inherent in the plant itself and the forces surrounding the plant, and the continued existence of the plant depends upon the establishment of an equilibrium. If any one condition, such as temperature, humidity, or exposure, be seriously altered, it is necessary to modify some of the other conditions to compensate for this in order to reëstablish an equilibrium, otherwise the plant will survive but a short time. This is the problem that the gardener must solve, and upon the solution depends the continued existence of the plant. This is a matter of judgment, so that a mere laborer cannot be a successful gardener. Gardening is an art and calls for niceties of judgment and discrimination. A man must feel the requirements of his plants or he cannot be a successful gardener, and this state can only come from much experience.

Herbaceous plants, if we except alpines and those insistent upon a peculiar soil, such as lime-lovers, offer less difficulty than others. They will, as a rule, stand greater extremes of temperature and humidity. Of course there are plants which will thrive only in situations warm and sheltered during the winter, and if we would cultivate such plants out of doors, we must furnish them these conditions. But the great majority of herbaceous plants, if at all suitable to the environment, will succeed if a mulch of old manure be given them during the fall. This should be an inch, or at most two or three inches, deep, depending on circumstances, but it should never be so thick as to cause a too early development of the plants in the spring, thus sub-

Collection of lilacs, the gift of Mr. T. A. Havemeyer. Set out in November 1912. Mulch of old manure.

A wood of deciduous trees, a natural windbreak for evergreens. Collection of the



Abutment at Woodlawn Avenue Bridge, an efficient windbreak for evergreens.

jecting them to frost attack. This top-dressing not only tends to preserve a more uniform soil temperature, with gradual instead of sudden changes, thus preventing lifting and heaving so fatal to plants of this kind, but it also enriches the soil. In the spring the rubbish should be removed, the finer matter spaded into the beds. The leaves and stems of herbaceous plants disappear before winter sets in, so do not need protection against transpiration of moisture through bark and leaves.

Trees and shrubs offer another problem, for in these the stems, and also the leaves in the case of evergreen plants, are present throughout the winter. Transpiration of moisture takes place through both stem and leaves, so we can understand why it is such plants are more difficult to cultivate in wind-swept situations. In deciduous trees and shrubs, those which shed their leaves every fall, this difficulty is not so serious, for the transpiration is not excessive. But even here the selection of some sheltered place will often enable us to cultivate species, which would otherwise be out of the question. Great benefit may be derived from placing a top-dressing three to five inches deep around the plant, especially if newly planted in the fall. This is shown in the accompanying illustration, plate CVIII., of a collection of lilacs presented to the Garden this fall by Mr. T. A. Havemeyer. Old manure, free from ammonia, may be used. This serves, as in the case of the herbaceous plants; to preserve a more uniform soil temperature, and to prevent the drying out of the soil around the plants.

It is, however, in the evergreens that we meet with our most serious problems. By evergreens are meant all plants which retain their foliage green during the winter. These are generally divided into broad-leaved evergreens, such as the rhododendron, laurel, Japanese holly, and box, and the conifers, such as pines, hemlocks, spruces, and firs. Here the large surface offered by the foliage exposes the plants to a severe drain upon their vitality if placed in wind-swept situations. It does not seem to be the cold which does the damage, but the warm dry winds of late March and early April, when we are congratulating ourselves that our plants have come through the winter well. Then let

one of these winds blow for a day or so, and havoc becomes at once manifest. Plants which were green the previous week will become brown. Sometimes only the tips of the leaves are affected, but often the entire foliage succumbs and this means the death of the plant.

And here the choice of location is of prime importance. Make a selection protected from the sweep of the winds. Remember that there are few evergreens, and these among the pines, that will stand the trying conditions to be found on exposed hills. A little valley or swale is an ideal place, and if the protection thus afforded is not sufficient it may be supplemented by planting the higher places with hardier and more resistant varieties, such as *Pinus sylvestris* and *Pinus austriaca*. This protection may consist of an existing wind-break of deciduous trees, as shown in plate CVIII. This view is in the Garden at the north end of the valley containing, among other collections, the economic garden. The native fringe of deciduous trees breaks the force of the winds from the north. The conifers here shown are the Japanese cedar, *Cryptomeria japonica*. There is also a small plant of *Sequoia Washingtoniana*, the Big Tree of California, which was set out a year ago the past fall and survived in excellent condition the succeeding trying winter. Further south in the same valley are trees of the Deodar, *Cedrus Deodara*, and of the Mt. Atlas Cedar, *Cedrus atlantica*. It would be impossible to cultivate these plants in an open wind-swept area. In plate CIX. an artificial wind-break is afforded by an abutment. This protects also from the north winds. The protection here is so effective that *Chamaecyparis Lawsoniana* may be cultivated, a difficult plant for this section, as it comes from the much milder and more humid climate west of the Cascade Mountains, and is consequently much affected by severe cold and especially by drying winds. Its successful cultivation in this spot illustrates the efficiency of choice of location for individual plants. The whole collection of conifers here remained in excellent shape after the trying conditions of last winter. Many of the species here represented were severely damaged in more exposed situations in other parts of the Garden.

If a wind-break of hardier evergreens, such as *Pinus austriaca* or *Pinus sylvestris*, be provided, evergreens may be grown with success in a flat wind-swept area. The essential and primary fact ever to be kept in mind in this selection is this, it is the excessive transpiration of moisture through the foliage of evergreens which must be guarded against. And as the wind greatly increases this transpiration, the more we can shut it out the better. The selection of a suitable place must be followed by proper care of the plants themselves. All evergreens enjoy and need each fall a generous top-dressing. This is to protect the roots from sudden extremes of temperature, and to guard against the drying out of the soil about them. This mulch should be three to five or six inches deep, and may consist of well-rotted manure in the case of conifers and some of the broad-leaved evergreens. Leaves of deciduous trees form an excellent mulch for conifers, and cannot be surpassed.

In the cultivation of rhododendrons, the most desirable of our broad-leaved evergreens, great care must be taken to exclude lime in any form, for they are very intolerant of this. They are such charming plants, in winter with their masses of luxuriant foliage, and in summer with a great profusion of delightful bloom, that any care is not too great to expend upon them. And if you give them even half care they will respond generously to the treatment. They will grow in open exposed sunny places, provided their roots are kept cool and moist in summer and protected in winter from sudden changes of temperature. These winter and summer requirements may be met by providing a generous top-dressing of old leaves, those of the oak preferred, for their decomposition results in a slightly acid soil, a condition to which the rhododendron and other members of the heath family are very partial. This top-dressing should be replenished every fall with freshly fallen leaves, the gradual decomposition of these furnishing an ideal covering, keeping the roots in the best of condition. During periods of drought or of unusual dryness rhododendrons should be generously watered. This is especially necessary when they are exposed to the direct sunlight. The top-dressing should be kept moist at all times, never being

allowed to become dry. The roots of these plants are fibrous and delicate and lime or lack of moisture is fatal to them.

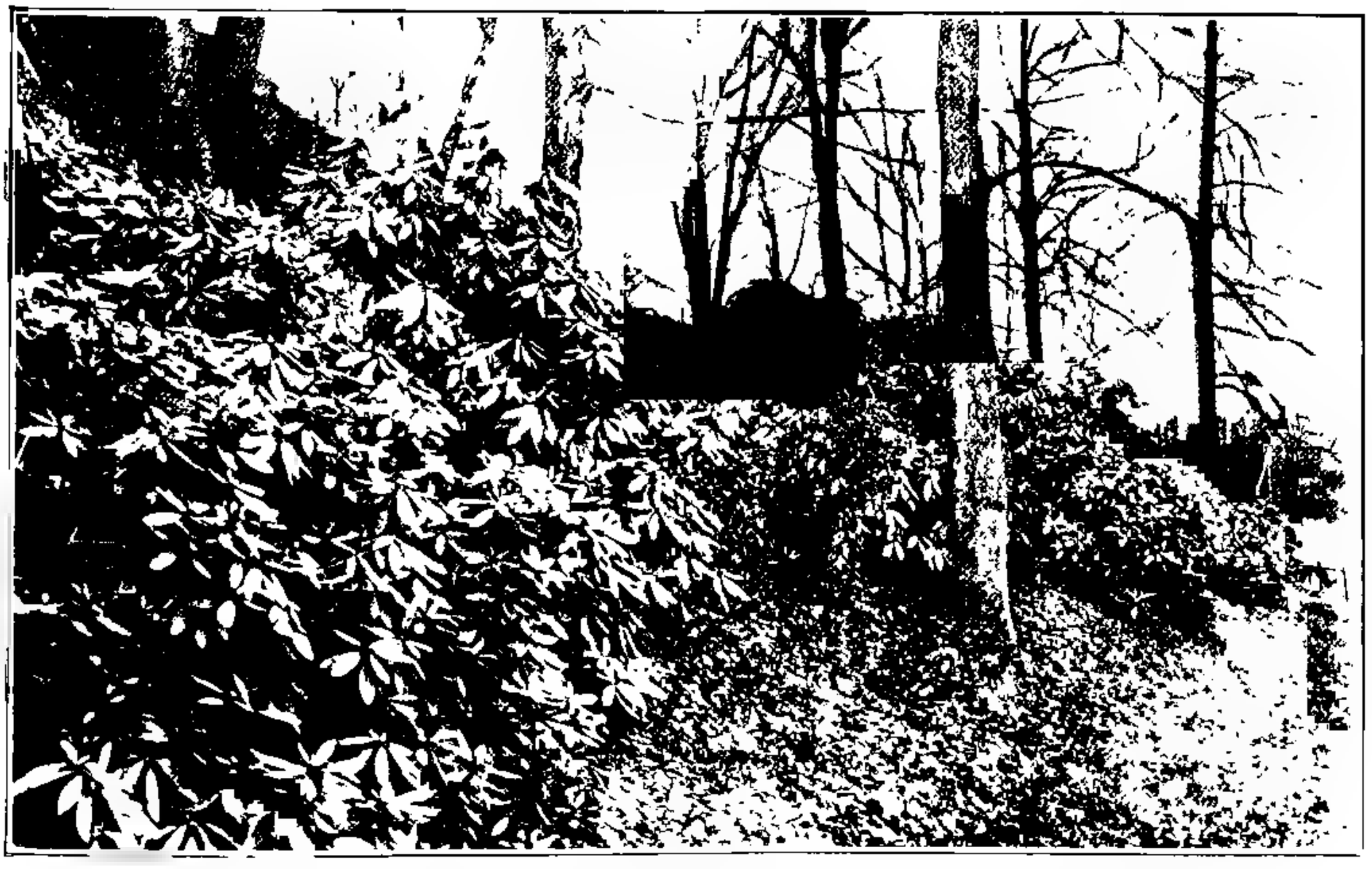
At plate CX. may be seen a view of a group of these plants located in a triangle in the vicinity of the Lake Bridge, to the north of the Museum. Here are *Rhododendron maximum* and *Rhododendron catawbiense*, the latter to the right. The point of meeting of the two species may be easily detected in the illustration, the longer leaves with the involute margins clearly separating the former from the latter, which has the broader flat leaves. The character of the top-dressing is shown in the foreground. A number of trees of the sourwood, *Oxydendrum arboreum*, have been recently planted here. These are of the same family as the rhododendron, and will eventually furnish the partial shade in which they delight. For open sunny situations *Rhododendron catawbiense* and hybrids upon which this species has impressed itself are much to be preferred to the other.

While rhododendrons with proper care may be cultivated in open sunny places, it is in a partially shaded location, such as that represented at plate CX., that the best may be expected of them. A hillside like this near the Lake Bridge in the Garden, facing away from the sun, sheltered with a scanty growth of deciduous trees, and a generous top-dressing of old leaves, furnishes conditions in which this, the showiest of our broad-leaved evergreens, luxuriates. Even in a favored situation of this kind it is desirable to make free use of water during dry periods.

A word of caution here in reference to the use of manure on rhododendrons. A good general rule is, don't. If you cannot secure old leaves for the mulch, it is better to top-dress them with old well-rotted manure, preferably cow manure, than to leave them without mulch of any kind. But to be sure that it is old and well-rotted. Fresh manure is fatal to them. If at all possible secure old leaves or leaf mold, for this is nature's own way of doing it, and it cannot be surpassed.

A word as to the protection afforded by group-planting. Many trees and shrubs may be cultivated in this manner which would

odendron triangle near Lake Bridge, showing mulch of old leaves. *Rhododendron maximum* and *R. catawbiense*, the former on the left.



not stand the environment if treated as individuals. The group of vegetation breaks the force of the wind, and prevents the excessive and disastrous transpiration. This is true not only of deciduous shrubs, but especially of evergreens of every kind. This was illustrated the past winter by several species here at the Garden which were planted both singly and in groups.

Then there is one last resort for the protection of plants which one is very desirous of growing out of doors. This is by individual protection. This requires time and care, but it will enable us to cultivate some desirable plants which would be impossible otherwise. If but little protection is wanted, an old barrel placed over the plant may suffice, or if this is not sufficient, it may be necessary first to wrap the plant in straw, or some similar article, before placing the barrel. Hemlock boughs tied around a plant will often serve the purpose, and has the added advantage of being green and hence a pleasing object to view during the winter. Board fences may be built for windbreak, protecting a whole collection in this way. Sometimes large individual trees of considerable height are protected every winter by placing about them a wooden portable house. This takes a lot of care and trouble, but if the specimen is a prized one, this may be the only way to do. The writer remembers a large tree of *Araucaria imbricata*, the monkey-puzzle, which grew in the shelter of a dwelling in southern Connecticut. This must have been twelve or fifteen feet high. Every fall a little wooden house was built around it, and the owner thereby had the satisfaction of seeing this peculiar tree in his landscape for a great part of the year.

GEORGE V. NASH.

CONFERENCE NOTES

The December conference of the Scientific Staff and Registered Students of the New York Botanical Garden was held in the laboratory December 2 with Dr. Murrill presiding. Illness made it necessary to postpone the program as announced, instead of which there were presented the following notes.

Dr. Marshall A. Howe exhibited specimens and drawings of a microscopic green alga, a species of *Endocladia*, that lives within the cell walls of certain larger filamentous green seaweeds. The small endophyte has abundant chlorophyll of its own and is probably either not at all or only in a slight degree parasitic. The material was collected in Peru.

Mrs. Britton exhibited specimens of *Ephemeropsis Tjibodensis* Goeb. from Penang Hill, Straits Settlements, Malay Peninsula, collected by H. N. Ridley, Director of the Botanical Gardens at Singapore (782), which were found unnamed in the Mitten Herbarium. She stated that this was an extension of range for this rare and interesting species, as heretofore it has been known only from Tjibodas in Java. Specimens and illustrations of two North American mosses having a permanent protonema were shown, *Pogonatum brevicaule* and *Discelium nudum*, and it was stated that in *Ephemeropsis*, when first described, the sporophyte was not known and that the protonema bears septate gemmae by which the species is propagated. As it grows on leaves in humid forests, these gemmae rapidly disseminate the species.

Dr. Murrill spoke briefly on species of the genus *Agaricus* occurring on the Pacific slope. Eighteen species are known from that region, nine of them having been recently described by Dr. Murrill. Among these, *Agaricus crocodilinus*, found at Ferndale, Humboldt Co., California, by Mr. H. J. Smith, is remarkable for its size, reaching fourteen inches in diameter, and for its conspicuous warty surface, which resembles the skin of a crocodile. This species is edible and an attempt is being made to obtain spawn of it for cultivation.

Dr. B. O. Dodge reviewed the recently published work of Dr. Hotson on bulbil producing fungi and spoke of similar phenomena noted in his studies of *Ascobolus magnificus*.

A plant of *Pelargonium zonale* showing a bud variation was exhibited and briefly described by Dr. A. B. Stout. The plant is a peripheral chimera with two peripheral cell layers of white tissue enclosing green colored tissue. The leaves have con-

spicuous white margins. On this plant there has developed a bud with the tissue relations reversed, *i. e.*, the green tissues of the leaves and the stems of this branch are enclosing the white tissue, giving leaves that are larger, more deeply lobed and which do not possess the white margins. The white tissue can be seen through the center of the leaf beneath the outer green layers. This is a type of bud variation that is due to the mechanical rearrangement of two different tissues which are already present in the plant. Brief reference was made to the various interesting observations that Baur has made in his studies of chimeras in *Pelargonium zonale.*

NOTES, NEWS AND COMMENT

Professor R. A. Harper, of Columbia University, spent several days during the holiday vacation visiting relatives in the West returning by way of Cleveland where he attended the scientific meetings of the A. A. A. S.

Eliot Blackwelder, associate professor of geology in the University of Wisconsin and geologist of the U. S. Geological Survey, visited the Museum on December 27 to examine the collections of calcareous algae, which interested him in connection with his studies of the nature and origin of certain western limestones.

Mr. Norman Taylor, curator at the Brooklyn Botanic Garden, spent ten days at the Garden during the holidays studying the collection of local plants.

Dr. John K. Small recently returned from a collecting trip to tropical Florida. About five weeks were spent in the field, part of the time in company with Professor Hugo de Vries, of the University of Amsterdam. Collections were made on the less explored parts of the Miami limestone region and the Florida Keys.

Dr. Arthur Hollick returned on January 1 from a three months leave of absence in Washington, D. C., where he was at work

for the United States Geological Survey on the fossil flora of Alaska.

Dr. H. A. Gleason, of the University of Michigan, spent the month of January at the Garden in studying the West Indian and Mexican material of Vernonieae in the Garden herbarium. Several new species were distinguished and will soon be published.

During November, Mr. Nash visited the Buffalo Botanic Garden and the Park System at Rochester, New York. This visit was for the purpose of inspecting the collections and of arranging exchanges of living plants. At Buffalo some interesting additions were secured for the tender collections, and also an assortment of hardy plants. At Rochester, where the collections are extremely rich in hardy trees and shrubs, over 100 species new to our collections were obtained. These were mainly shrubs, with some trees, and they will add much to the interest of the outdoor collections.

Dr. Rydberg spent a month during October and November at Washington, D. C., working on the Rosaceae for a future number of North American Flora and on the Flora of the Rocky Mountains. From these studies a number of new species have been added to the flora of the Rocky Mountain region. While in Washington Dr. Rydberg lectured before the Botanical Society of the City of Washington on "Botanizing in the Region of the Natural Bridges of Southeastern Utah."

The Garden experienced a severe wind storm on January 3 and 4. For a part of the time the wind velocity was at the rate of 90 miles per hour. Ten trees were uprooted; several were hickory trees that had been killed by wood and bark boring insects. One live hemlock was blown down and a number of trees and shrubs sustained broken branches. There was no breakage of glass at any of the conservatories.

The remarkably warm weather of the first week in January, with the ground not frozen, has permitted work of various kinds to be accomplished, unusual in midwinter; earth has been handled in various ways, and if any planting had been organized in advance, it would have been possible to have moved trees and

shrubs as readily as in spring. Considerable sodding was accomplished, especially around the bases of all lamp-posts, where the surface had become damaged by lamplighters. Over 1,000 square feet of sod was used in making these repairs.

Meteorology for December.—The total precipitation for December was 5.95 inches. The maximum temperatures recorded for each week were as follows: 64° on the 6th; 49° on the 15th; 48° on the 19th; and 48° on the 25th. The minimum temperatures were 18° on the 9th; 12° on the 13th; 24° on the 23d; and 20° on the morning of the 25th.

Meteorology for the Year 1912.—The total precipitation at the New York Botanical Garden was 38.6 inches which was distributed as follows: January, 2.44; February, 1.98; March, 6.36; April, 2.28; May, 3.45; June, 1.05; July, 2.84; August, 2.54; September, 3.80; October, 3.44; November, 2.47; December, 5.95.

The maximum temperature for the year was 100° on July 9, and the minimum was −6° recorded for January 12.

The season has been unusual in many respects. The winter was severe and very destructive to vegetation, especially to evergreens. An account of the losses sustained in our plantations was given by Mr. Nash in the July JOURNAL. An exceptionally heavy flood in the Bronx River, described in the April JOURNAL, occurred March 13, but the damage done was largely confined to scattering rubbish over the meadows. The usual summer drought occurred much earlier in the season than for several years past, while showers fell later in the year. The autumn was the mildest and most beautiful known in the history of the Garden.

The collections of desert plants in conservatory range 1, houses 5 to 8, are of especial interest at the present time. In house 5 the aloes, mainly from southern Africa, are coming into bloom, making a fine show of color on the center bench. Near-by is a fine specimen, now in bloom, of *Euphorbia benedicta*, a native of San Benito Island, Lower California, and collected there in 1911 by Dr. J. N. Rose on his expedition in search of cacti. This is an exceedingly rare plant in cultivation. This leafy shrub is

quite in contrast with the fleshy euphorbias on the same bench, which so much resemble some of the columnar forms of *Cereus*. In house 6 is a large plant of *Fouquieria formosa*, secured by MacDougal and Rose during an expedition to Tehuacán, Mexico, in 1906. This is now flowering for the first time. There are six known species of this genus, all inhabitants of tropical or warm arid regions in North America. Three of these, *F. splendens* and *F. Macdougalii* in addition to the above, are in cultivation at the Garden. The development of the spines in this genus is peculiar, they being formed within the petioles of the young leaves. In houses 7 and 8 are the collections of cacti.—G. V. N.

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OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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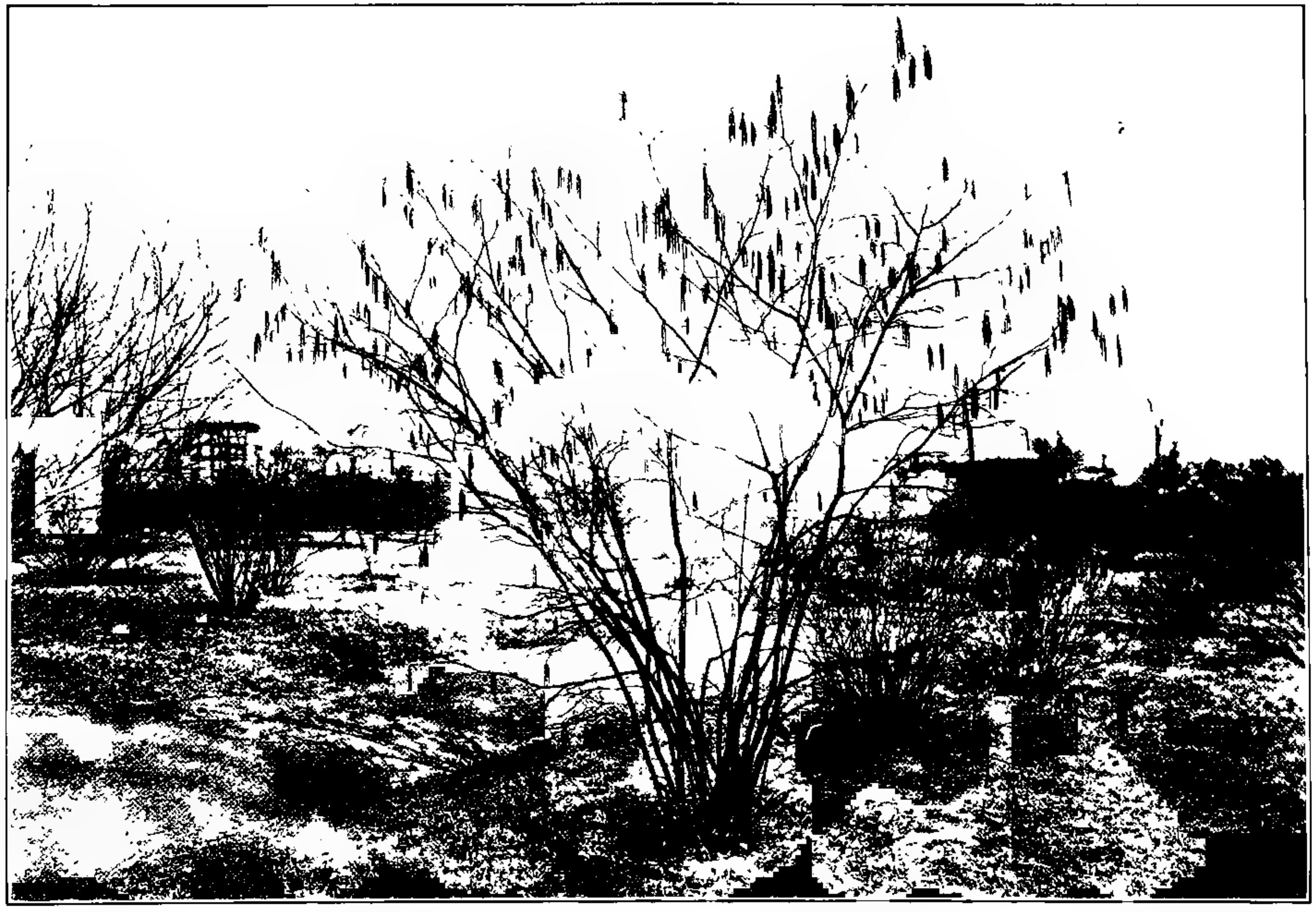

The Asiatic Hazel-nut, *Corylus pontica* Koch, in Full Bloom in January, 1913, in the Fruticetum.

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WINTER FLOWERING

The high temperature of the present winter, unprecedented in weather records, has been remarkable, and has forced a number of plants into bloom out of their normal season. The most marked instance of this is *Corylus pontica*. A large specimen of this in the fruticetum, an illustration of which accompanies this article, was in full bloom on January 24, and still continues in flower. The normal time of flowering of this species about here is late in March or early April. On December 19 a plant of *Forsythia intermedia* in the fruticetum was noted with about a dozen flowers fully expanded, its normal flowering period hereabouts being at the end of April or early in May. The following shrubs, normally blooming in late April or early May, had scattering flowers as late as January 24: *Cydonia japonica; Lonicera fragrantissima; Lonicera Standishii; Rhus aromatica;* and *Spiraea Thunbergii*. *Daphne Mezereum*, with a normal flowering period in this neighborhood of early April, was also in flower on the above date. *Ribes fasciculatum* and *Ribes diacantha*, the latter an early May bloomer, at the same time had well-developed leaf-buds, so that a decided greenish tinge was given to the plants. The only one of the bulbous plants noted in bloom was *Galanthus nivalis*, the snowdrop, a few scattering flowers in various parts of the grounds.

This abnormal flowering may be a matter of considerable interest, but the phase of it which particularly interests the

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writer is the after-effect on the plants themselves. It will be noted that all the plants affected are early bloomers, among the earliest in the gardens. This is to be expected, for it takes but little additional heat to start plants of this kind, their flower-buds and leaf-buds being already well developed. If the final result is only the destruction of the bloom for next spring, no permanent injury will have been done.

What the general effect will be of the open warm weather, especially if followed by severe weather later, is a matter of much concern. While this weather persists the wood cannot properly "ripen" and be in a condition to withstand severe cold. A gradual increase of cold would probably avert the difficulty. It is to be hoped that this is not prophetic of the destruction of our evergreens, but not until the warm winds of March and April come can this be determined. The winter of 1911–12 was especially severe on them, and this followed by equally or even more severe weather the present winter, is not a condition to be looked forward to with much confidence.

GEORGE V. NASH.

FURTHER BOTANICAL EXPLORATIONS IN PINAR DEL RIO, CUBA

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF,

Sir: Embarking from New York, Saturday, July 20, 1912, Havana was reached on the following Wednesday and the city of Pinar del Rio next day. Here I looked up Mr. S. T. Holmes, whose acquaintance I had formed on my first trip to Cuba in 1903. Mr. Holmes gave me helpful information concerning the region in which I was to operate. He also introduced me to a local banker, Sr. Ricardo Cuevas, who gave me a letter to the proprietors of "La Central" in Sumidero.

Sumidero was reached by "guagua" on a macadamized road traversing over clay and mica-shist hills and the Cerro de Cabras on Friday evening. The next day was spent in securing suitable quarters and arranging my equipment.

My first collections were made July 28 on the lower sierras, close by the village, and during the following weeks that I remained there frequent excursions were made to the various types of sierras, some of which I ascended, others were crossed, some were gone around and I passed underneath one of them. They vary in height to about 1,000 feet, rising abruptly from the valley of Rio Cuyaguateje, which at this point is about 250 feet above sea-level; they are isolated, in groups, or in short ranges and in several instances cut across the valley, compelling the river to pass underneath them through caverns; at another place the river forces its way through a deep narrow gorge. Smaller streams also encounter such barriers before reaching the main river and pass into caverns, or disappear at the foot of an interrupting cliff.

These sierras are solid rock masses of hard, dark-colored limestone similar to those near Guane, visited by me last winter. They are quite bare, especially on their southern and eastern faces. The most prominent trees are "Palma de Sierra," *Gaussia princeps*, "Drago," *Bombax emarginatum*, a large spreading-topped *Ficus*, and "Bonita de Sierra," *Spathelia Brittonii*, a palm-like branchless, hard-wooded tree, attaining a height of about 30 feet with a maximum trunk diameter of four inches; its leaves, all tufted on the top and at this season terminated by a large panicle of numerous, small rose-colored flowers, making it a very striking object as it is perched at inaccessible points high up on the side of a bare sierra. They are not abundant, but occur in scattered individuals. After the tree has ripened its fruit, it dies; the dry trunk remains standing for several years, as the wood is very durable. I was informed it is highly prized for fence posts. An arborescent cycad, *Microcycas calocoma*, also occurs among loose rocks on top of some of these sierras, especially on one about 700 feet altitude on the west boundary of La Guira, where it is called "Palo de Chivo." At this point it was found in considerable numbers and all sizes from young trunks six inches tall to old ones probably twenty-five feet by eight inches in diameter. No inflorescence or fruits rewarded a diligent search. Several tall specimens that had their tops

blown off by a previous storm were sending out tufts of leaves along their sides. Another feature of these barren rocks is the great quantity of bromeliads, of which there are at least six species, representing several genera. They cling to the sides and tops of the cliffs to which they often impart a distinct coloration, reddish or yellowish. Some of the larger ones, called "Curujei," accumulate considerable water, often six to eight ounces, at their leaf bases. This is sometimes drunk by the thirsty climber, whose canteen has become empty. If there is no contamination of decayed organic matter, the water is quite wholesome. Three creeping cactuses representing the genera, *Selenicereus*, *Harrisia* and *Leptocereus;* the first being especially abundant, the last is new and quite rare and seems to occur only on the top of the highest rocks; the flowers and fruits of the first two are well known, but the fruit of the last is unknown and is apparently seldom formed, as I secured a number of withered flowers, which are quite small. I presume the blooming season was just past; no young fruit, however, was found. Thickets about the base of many of these rocks especially those that have been burnt over were a mass of color due to the profusion of reddish flowers of a woody vine, *Bignonia Sagraeana*, reminding one very much of the *Bougainvillea* of our northern conservatories.

I went as far northwest as Sierra de Francisco, which is the most northwesterly of the limestone sierras. Beyond this there are silicious hills with open pine woods and live oak thickets. I got partly up the side of Sierra de Francisco and found it more densely wooded than the sierras to the south. Further progress was prevented by a terrific rain and thunder storm, which made the return to Sumidero very unpleasant and we barely escaped being marooned on the wrong side of the river, which was rising rapidly and became unfordable for several days thereafter. Northeastward of Francisco are two massive peaks known as Gramales. They are probably 1,200 feet in altitude and similar in appearance to their western neighbor. I rode along the northern base of them, but found it impractical to make an ascent. On this excursion I got as far as Peña Blanca and had a good view of the southwestern side of Pan de Azucar, which seems

to be the highest point in this region and, unlike the rest of the sierras, has its rock mass rising out of a foot-hill formation which is probably covered with soil, for there are forests and cleared land upon it. This region, no doubt, would be worthy of further investigation. On my return to Sumidero, I encountered a number of the tall cycads at the head of a ravine in the pinelands through which our road passed.

During my stay at Sumidero, Brother León, of Colegio de la Salle, Havana, well known to us on account of his knowledge of the Cuban flora, honored me by a visit and remained my guest for nearly a week, during which time four full and very strenuous days were spent afield; two of these were devoted to the limestone formations, and as Brother León had seen very little of the silicious and pineland flora of the island, two days were spent in following up the course of Arroyo del Sumidero, through the Pinales to its source high up the side of Cuchillas de San Sebastian, which we also ascended to its summit, an altitude of about 1,200 feet and from where an extended view and a better knowledge of the position of the various sierras was secured. In addition to the pine trees, most of which have been destroyed by fire or high wind, the features were thickets of live oaks, called "Encino," by the Cubans, and a great variety of shrubbery; among these are at least four species of Melastomaceae; a low myrtaceous shrub with a pleasant-tasting aromatic fruit called "Guayabito del Pinales," was very abundant; a considerable variety of grasses also occurred on the dry hillsides. In moist thickets near the stream a trailing *Lycopodium*, two climbing ferns and a tree-fern were frequent. On this trip nightfall overtook us on the cuchillas, several hours from the village, but the fortunate occurrence of fat dry pine wood, from which our practico prepared a smoky but very useful torch, saved us the unpleasant experience of spending a night in the woods unprepared. As our time and energy on these four days was about equally divided between the limestone formation and the silicious formation, the collections made should serve as a fair indication of the comparative richness in species of the respective floras; fifty-seven numbers were taken in the limestone formation and

one hundred and thirty-three in the silicious. Very few plants were found to be common to both formations, the Cuban walnut, *Juglans insularis*, to our surprise being one of these found on both.

On September 5, having packed and shipped the entire collections and my outfit to Pinar del Rio by caretta and arranged for the shipment by rail from there to Havana, I went on horseback to Guane, for the purpose of seeing the sierras lying southward of these that I had already seen or examined about Sumidero. I found that they are very extensive south of Luislazo; a range extends westward to Mal Paso, where the river cuts its way through a narrow gorge, after which it forms a broader valley separating two ranges running north and south. The western range diminishes gradually and terminates at Los Acostas; the eastern range is more massive and extends further south, terminating abruptly with a southern exposure several miles wide at Punta de la Sierra. From this hasty and often distant view I had of these mountains, I concluded that the general formation was quite similar to those I had already examined and that the same species of plants occur among them with the exception that there are a number of fissures or canyons which may contain running water, in which case a different and richer plant association is to be expected.

Southward of Punta de la Sierra the valley of Rio Cuyaguateje broadens and is bounded by silicious hills, once, no doubt, covered by pine forest, but now quite barren of any arborescent flora. Occasional protrusions of the lime rock occur in the valley, the most extensive being in the vicinity of Teneria, where it is distinctly stratified horizontally and forms a low ridge about seventy-five feet high, extending about half a mile diagonally across the valley. Southward and several miles to the east of Portales rises Sierra Guane, about which I collected last winter. Occasional clumps of lime rock are seen along the roadsides. One of these, which covers about 100 square feet and is not over fifteen feet high with a fresh-water spring at the base, rises out of a level field and is shaded by a number of large mango trees. This was literally covered with a triangular creeping cactus of the

genus *Hylocereus*, bearing hundreds of large white flowers and numerous scaly red fruits, its close companion being the large-leaved *Anthurium recussatum*. This rockery was entirely natural and its plants had every appearance of being native, but its proximity to several houses and the presence of mango trees leaves one in doubt as to whether the cactus was really native.

Guane was reached late in the afternoon, Pinar del Rio the next day and Havana the day following. To Don Ramon Barrero and Don Filipe Ortiz, proprietors of "La Central," who prepared special quarters for me at their "Establecimento Mixto" and showed me every kindness, and to Sr. Fernando Ramos, of Sumidero, whose kindly interest in my work was encouraging as well as very helpful, I owe my sincerest gratitude; also to Brother León, who as usual showed me kind and helpful attention while in Havana.

I embarked from Havana September 10 and arrived in New York on the 14.

Respectfully submitted,
J. A. SHAFER.

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tonia virginica L.). Jour. N. Y. Bot. Gard. **13**: 91, 92. *pl. 95*. Jl 1912;—III. "Wild Pink" (*Silene caroliniana* Walt.). Jour. N. Y. Bot. Gard. **13**: 109, 110. *pl. 97*. Au 1912;—IV. "Wild Columbine" (*Aquilegia canadensis* L.). Jour. N. Y. Bot. Gard. **13**: 123, 124. *pl. 98*. S 1912;—V. "Bird's-foot Violet" (*Viola pedata* L.). Jour. N. Y. Bot. Gard. **13**: 135, 136. *pl. 99*. O 1912.

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CONFERENCE NOTES

A monthly conference of the scientific staff and registered students of the New York Botanical Garden was held in the main laboratory on January 6.

Mr. Guy West Wilson presented some of the results of his studies under the topic "Notes on Peronosporales." The report was confined in the main to a discussion of certain species of the genus *Peronospora*. As an introduction the essential taxonomic characters were discussed. These include the markings of the oöspore, the color, form and size of the conidia and the form, size, and development of the conidiophores. One of the most important and constant characters is found in the form and size of the ultimate branchlets of the conidiophores. The oöspore characters do not show a sufficient range of variation, not to mention their rather infrequent appearance, to be useful generally in determining species, while the size and number of

conidia vary sufficiently with ecological conditions to make it unsatisfactory to depend on them alone for differential characters.

The species of *Peronospora* on five families of hosts were discussed, with especial reference to the American species. The Leguminosae harbor four species of the genus, two being American and all European. One of these, *P. trifoliorum*, is of some economic importance. Four species are also found on the Boraginaceae, two of which, *P. cynoglossi* and *P. echinospermi*, are strictly Americans and of rather restricted range. The Pink Family harbors six species, three of which are found in America, one being endemic. On the Cruciferae three species are recognized, one European, one *P. parasitica*, appears to be cosmopolitan, and an undescribed species may be strictly American. On various Chenopodiaceous hosts there occur three species of *Peronospora*, two being American and both rather widespread, but by no means among the more abundant species of the genus. Although separated as early as 1852 as separate species these have been frequently grouped together and very much confused by mycologists. The third species, *P. Schachtii*, is confined to beets in Europe.

At the conclusion of the discussion of this report, Professor R. A. Harper and Professor H. A. Gleason gave interesting accounts of the sessions of the various botanical sections of the American Association for the Advancement of Science, recently held at Cleveland, Ohio.

NOTES, NEWS AND COMMENT

Dr. N. L. Britton, director-in-chief, sailed for the West Indies January 25, on an exploring expedition, accompanied by Dr. J. N. Rose, Dr. J. A. Shafer, Mrs. Britton, and Miss Delia Marble.

Dr. W. A. Murrill, assistant director, visited Professor Atkinson at Cornell University on January 15, and Professor Peck at Albany on January 17, to examine types of some of the poisonous species of fungi.

The New York State Forestry Association was organized at Syracuse on January 16, and interesting papers were read by Messrs. Pinchot, Pettis, Bristol, Moore, Dennis, Mulford, Baker, and others. Dr. N. L. Britton was elected president and Dean Hugh P. Baker secretary for the ensuing year. The Garden was represented at this meeting by Dr. Murrill.

Professor A. H. Evans visited the Garden on January 10 to examine the mycological herbarium and to consult with reference to methods for mounting and preserving fungi.

An important collection of Porto Rican fungi has recently been sent in for determination by Dr. John R. Johnston.

Dr. Mel T. Cook, of the New Jersey Experiment Station, spent two days during the past month consulting various books in the Garden library.

Professor H. T. Blakeslee, Professor W. L. Bray and Mr. E. C. Ewing were visitors at the Garden recently.

Meteorology for January.—The total precipitation for the month was 2.49 inches. Maximum temperatures for each week were as follows: 59° on the 3d, *62° on the 12th*, 60° on the 17th, 58° on the 26th, and 57° on the 31st. The minimum temperatures were 26° on the 2d, *17° on the 9th*, 20° on the 14th, 22° on the 22d, and 25° on the 29th.

In conservatory range no. 1, house no. 5, the fig-marigolds, *Mesembryanthemum*, are coming into flower and will continue in bloom for several weeks. This is a large genus, native of southern Africa, containing about 300 species. These plants present a great variety of form, both in habit and foliage. The tiger-mouth fig-marigold, *M. tigrinum*, has the fleshy leaves armed with long marginal teeth; the wolf-mouthed fig-marigold, *M. lupinum*, has similar leaves. Others, like *M. echinatum*, have the cylindric leaves covered with hairs, and still others, as in *M. barbatum*, have a tuft of long hairs at the apex. In *M. linguaeforme* and *M. pustulatum*, the fleshy leaves are long and tongue-shaped. While *M. Zeyheri* and many others are tall bushy plants, bearing a profusion of richly colored flowers, white, pink, yellow, or purple. They are of easy culture, growing

well in an ordinary greenhouse, and are deserving of more general cultivation, blossoming freely in the early months of the year.—G. V. N.

In house no. 13, the Cherokee rose, *Rosa laevigata*, is again coming into bloom. This is a delightful rose, a native of China. It has become extensively naturalized in the southern states and in the West Indies. This is not hardy in the latitude of New York, but fortunately it has passed on its beautiful blossoms to that charming rose, Silver Moon, a hybrid, of which it is one of the parents. The hardiness of this new rose is derived from its other parent, *Rosa Wichuraiana*, which stands the severest winters we have had. The Cherokee rose is also known as *R. ternata* Poir., *R. nivea* DC., *R. cherokeensis* Don., *R. Hystrix* Lindl., and *R. amygdalifolia* Ser.—G. V. N.

In house no. 7, the different species of the genus *Rhipsalis* are coming into bloom. These are epiphytic cacti, resembling in this respect many of the orchids, though far removed from them in botanical relationship.—G. V. N.

ACCESSIONS

MUSEUMS AND HERBARIUM

7 photographs of type specimens of marine algae in the Agardh herbarium. (From the University of Lund, Sweden.)

50 specimens ot mosses from Sidney, British Columbia. (Collected by Professor John Macoun.)

14 specimens of mosses from the Yellowstone National Park. (Given by Miss Julia T. Emerson.)

20 specimens of flowering plants from Mexico. (Given by Prince Roland Bonaparte.)

142 specimens of lichens from North America. (From the herbarium of J. H. Hart.)

2 specimens of Florida arrowroot starch. (Given by Miss Ruth N. Sulzner.)

8 specimens for the economic museum from Cuba. (Collected by Dr. J. A. Shafer.)

1 staminate cone of *Cycas cercinalis*. (From plant cultivated in the conservatories of the New York Botanical Garden.)

1,643 specimens from Wisconsin. (By exchange with the Field Museum of Natural History.

41 specimens of mosses from the United States. (By exchange with Professor Aven Nelson.)

3 specimens of mosses from Illinois. (By exchange with the Field Museum fo Natural History.)

12 specimens of flowering plants from Nebraska. (By exchange with Rev. J. M. Bates.)

1 specimen of *Dicranum flagellare minutissimum*. (Given by Dr. A. J. Grout.)

2,753 specimens of mosses. (Being the moss collection of J. A. Allen.)

1 specimen of *Eucladium verbanum* from Italy. (By exchange with Mr. H. N. Dixon.)

10 specimens of Podostemaceae from tropical America. (By exchange with the Botanical Garden, Utrecht, Holland.)

1 specimen of *Vaccinium Thibaudii* from tropical America. (By exchange with the Botanical Garden, St. Petersburg, Russia.)

7 specimens of lichens from the United States. (By exchange with Professor Aven Nelson.)

241 specimens of flowering plants from Michigan. (By exchange with the Field Museum of Natural History.)

50 specimens "Phytotheca Boreali-Americana," fascicle 38. (Distributed by Collins, Holden, and Setchell.)

12 specimens of mosses from New Hampshire and Pennsylvania. (By exchange with Dr. A. F. K. Krout.)

1 specimen of *Abies balsamea* from New York. (Given by Mr. John C. Galvin.)

3 specimens of mosses from Canada. (By exchange with Brother Leon.)

67 specimens of North American plants, mostly from Mexico. (By exchange with the United States National Museum.)

40 specimens of grasses from Cuba. (By exchange with Brother Leon.)

1 specimen of *Dicranella flagellare* from Minnesota. (By exchange with Professor J. M. Holzinger.)

6 specimens of lichens from South Dakota. (By exchange with Professor S. S. Visher.)

PLANTS AND SEEDS

1 plant of *Dendrobium platycaulon*. (By exchange with Fairmont Park, Philadelphia.)

3 plants for conservatories. (By exchange with Fairmont Park, Philadelphia.)

3 cuttings of *Opuntia tomentosa* from Bermuda. (Collected by Dr. N. L. Britton.)

2 cactus cuttings. (By exchange with Indian Museum, Calcutta, India.)

3 plants for conservatories. (By exchange with Mr. F. Light.)

216 lilacs and other shrubs for the decorative collections. Given by Mr. T. A. Havemeyer.)

1 plant of *Lupinus*. (Given by Miss Genevieve R. Watson.)

10 cactus plants for conservatories. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

38 plants of *Opuntia* and *Cereus* for conservatories. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

626 herbaceous plants for new decorative beds at Conservatory Range 1. (Purchased.)

3,136 miscellaneous bulbs for decorative beds. (Purchased.)

340 lily bulbs for new decorative beds at Conservatory Range 1. (Purchased.)

313 shrubs and trees for hardy collection. (By exchange with Board of Park Commissioners, Rochester, N. Y.)

2 plants of *Dracaena fragrans Lindeni*. (By exchange with Mr. A. J. Manda.)

3 cactus plants for conservatories. (Given by Mr. Randall Comfort.)

3 cactus cuttings for conservatories. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

1 *Opuntia monacantha*. (Given by Mr. Koltze.)

125 Washington plants for hardy collections. (By exchange with Park Commission, Spokane, Wash., through Mr. J. W. Duncan.)

25 plants ot *Butomus umbellatus*. (Given by Brother Victorin.)

2 plants of *Echinocactus Lecontei*. (Given by Dr. R. E. Kuntze.)

66 plants for conservatories, mainly orchids. (By exchange with Missouri Botanic Garden.)

3 plants for conservatories. (Given by Mr. F. R. Newbold.)

1 plant of *Opuntia Lindheimeri*. (By exchange with U. S. Nat. Museum, through Dr. J. N. Rose.)

4 bulbs of *Bletia* sp. from Mexico. (By exchange with Dr. J. C. Harvey.)

21 plants derived from seeds from various sources.

1 packet seed. (By exchange with Missouri Botanic Garden.)

3 packets of Washington seeds. (By exchange with Park Commission, Spokane, Wash., through Mr. J. W. Duncan.)

23 packets seed. (By exchange with Board of Park Commissioners, Rochester, N. Y.)

2 packets of seed. (Given by Miss Genevieve R. Watson.)

1 packet of seed of *Silene* sp. from Bermuda. (Collected by Dr. N. L. Britton.)

27 packets of seed, from Durban Bot. Gard., S. Africa. (By exchange with University of Chicago, through Dr. C. J. Chamberlain.)

1 packet of seed of *Viburnum Wrightii*. (By exchange with Buffalo Botanic Garden.)

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HENRY W. de FOREST

Term expires January, 1915

N. L. BRITTON — JOHN I. KANE
ANDREW CARNEGIE — W. J. MATHESON
W. GILMAN THOMPSON

Term expires January, 1916

THOMAS H. HUBBARD — GEORGE W. PERKINS
J. PIERPONT MORGAN — FRANCIS LYNDE STETSON
MYLES TIERNEY

2. EX-OFFICIO MANAGERS

The President of the Department of Public Parks
HON. CHARLES B. STOVER
The Mayor of the City of New York
HON. WILLIAM J. GAYNOR

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DR. ARTHUR HOLLICK, *Curator* (Fossil Plants)
ROBERT S. WILLIAMS, *Administrative Assistant*
PERCY WILSON, *Assistant Curator*
GEORGE. V. NASH, *Head Gardener*
DR. A. B. STOUT, *Director of the Laboratories*
DR. JOHN HENDLEY BARNHART, *Bibliographer*
SARAH H. HARLOW, *Librarian*
DR. H. H. RUSBY, *Honorary Curator of the Economic Collections*
ELIZABETH G. BRITTON, *Honorary Curator of Mosses*
DR. WILLIAM J. GIES, *Consulting Chemist*
COL. F. A. SCHILLING, *Museum Custodian*
JOHN R. BRINLEY, *Landscape Engineer*
WALTER S. GROESBECK, *Clerk and Accountant*
ARTHUR J. CORBETT, *Superintendent of Buildings and Grounds*

View in Conservatory Range No. 2 showing several Stag-Horn Ferns.

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THE STAG-HORN FERNS

Few common names of plants convey so exact and definite an idea of the plant as the name stag-horn or elk-horn ferns, by which the species of the genus *Alcicornium* are universally known. From plate CXII, which represents a section of conservatory range no. 2 at the New York Botanical Garden, with the swinging baskets hanging above the walks between the other plants, each basket clasped by an *Alcicornium*, the likeness of these ferns' fertile leaves to branching antlers may be clearly seen. Nor does the likeness stop here, for in size also the leaves of many of the species rival or exceed the elk's horns. *A. coronarium* is known to spread its leaves to an extent of fifteen feet in its native forests, and other species are not far behind.

The name *Alcicornium* itself signifies horns of the elk. It was applied first to the genus in 1826 by the French writer Gaudichaud, on page 48 of Freycinet's "Voyage Autour du Monde sur l'Uranie et la Physicienne," Desvaux, a year later, in 1827, bestowed on the genus the name *Platycerium*, by which it became widely known, but Gaudichaud's *Alcicornium*, as the earlier name, should have the right of way.

Gaudichaud's allusion to these plants was not by any means the first mention of them in botanical literature. As early as 1705 Plukenet figured and described a stag-horn fern from Africa and eighty years later Müller followed with one from Siam. There came others from various countries, until today thirteen species are known. Only one of these, *A. andinum*, is from

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America. This comes from the mountains of Bolivia and Peru. Four species, *A. Ellisii*, *A. madagascariense*, *A. Stemaria* and *A. angolense*, come from Africa, and the first two of these are known only from Madagascar. Two species, *A. Hillii* and *A. Veitchii*, come from Australia. One species, *A. Wallichii*, is confined to India, one, *A. Willinkii*, supposedly to Java, and one, *A. sumbawense*, supposedly to Sumbawa, although some doubt has been expressed as to whether these last two may not prove to be identical. The remaining three, *A. grande*, *A. coronarium* and *A. bifurcatum*, are variously scattered in tropical and subtemperate countries of the Old World.

On plate CXIII a young plant of the American species is represented. From this some of the characteristic marks of the stag-horns can be seen, notably the manner of growth, the coarse dissimilar fertile and sterile leaves, and the more or less netted veins. The sporangia are spread in large patches on the surface of the leaves, the spore-bearing area varying in position in the different species. Scattered about the leaves or mixed with the sporangia, sometimes forming a woolly or cobwebby covering, minute stellate hairs or scales occur. Seen through a microscope, these sometimes suggest tiny translucent pond-lilies or the blossoms of a double-flowered many-petalled Star of Bethlehem. Others are distinctly octopoid in shape. These scales are often deciduous.

The fertile leaves are sometimes produced in pairs, but in *A. Willinkii* they are produced in threes, and in *A. Veitchii* in a cluster which sometimes contains eleven. Some of the stag-horns hang their antlers; in *A. Willinkii* they are said to fall straight down. *A. Hillii* and *A. Veitchii* hold theirs stiffly up.

In the last three species and in *A. bifurcatum* the spore-bearing areas are confined normally to the lobes of the leaves. In *A. Stemaria* they form broad mats, each close to the sinus between the lesser forks of the leaf and extending into them. *A. Wallichii* is peculiar in having the spore-bearing area on the under surface of an extended convex lobe which is produced in a sinus between forks of the leaf. In *A. coronarium* also the spore-bearing area is in a sinus between forks of the leaf, but its position is unique.

Photograph of a Young Specimen of the American Stag-Horn Fern *Alcicornium andinum*.

It occupies the concave surface, forming a sort of lining, of a half-cup shaped receptacle attached to the leaf by a distinct stalk.

In two of the African species the likeness of the leaves to antlers must be said to become extremely vague and fanciful, and in a third to fail completely. These two are Madagascar's endemic species, *A. Ellisii* and *A. madagascariense*, and the third is *A. angolense*. *A. Ellisii* was received first from a missionary on the Island, the Rev. Mr. Ellis, and bears his name. It has fertile leaves with two rounded lobes at apex, and with the spore-bearing area reniform. *A. madagascariense* has fertile leaves with irregular apices showing a tendency to fork, and the spore-bearing area irregular in shape, following the outline of the leaf. *A. angolense* and its occurrence in the Congo have been well described by Monsieur Émile Laurent in the *Revue de l'Horticulture Belge et Étrangère*, in 1902. Writing of the ferns of the forest, he says, "There also are some which twine about the stems [of palms] (several *Lygodiums*), or which install themselves on the large horizontal branches (*Polypodium trichoides*), or which are attached to trunks of trees like gigantic nests of birds; these are the *Platyceriums*."

Of *A. angolense* Monsieur Laurent writes:

"I have never encountered this on this side of Stanley Pool (Léopoldville). It is, on the contrary, very much scattered beyond there, on the borders of Kassaï, of the Lulua, of the Sankura, of the Lualaba-Congo and in the great central forest, of which it is certainly one of the characteristic species. Stanley, in his celebrated tour of the dark continent has remarked of it and designated it in his book under the name of fern *with elephant's ears*, an appellation perfectly justifiable. The *ears* are the spore-bearing leaves, they are entire, and constitute an exception in the genus *Platycerium;* they sometimes reach a length of 80 cm. and a width of 60. The sterile leaves constitute a girdle of an extreme elegance applied to the trunks and the branches. I remember discovering thousands of specimens in the month of December, 1895, in a woody ravine between the Sankura and the Lorami; they formed on the long branches of the trees a con-

tinuous mantle of a very peculiar greyish sea-green. It was one of the strangest landscapes I have seen in the upper Congo. Each year, at the rainy season in the region of dry periods, at the time of the great precipitation in the great forest, the *Platyceriums* produce at first some sterile leaves, then others that carry the spores. The first are placed against each other; the most ancient, long since dead, persist in the form of an overturned mass, which, together with the roots, constitute a great sponge destined to retain the water streaming along the branches and the trunk. It is a precious reserve which prevents the plant from drying up completely in the intervals of dryness, for there are short periods deprived of rain, the same as in the equatorial forest. Thus may be explained, in the case of many epiphytic plants, the structures which characterize the species of regions having an abbreviated dry season. The fertile leaves are not divided and carry on the lower surface a large patch of light chestnut-red occupied by the spore-bearing tissue."

Many, possibly all, of the species of stag-horns are to be found in cultivation in greenhouses. Six are represented at the New York Botanical Garden, growing in conservatory range no. 2. These are *A. angolense*, *A. bifurcatum*, *A. grande*, *A. Hillii*, *A. Stemaria* and *A. Willinkii*. Conservatory range no. 2 may be reached by following the road past the east end of the Museum Building, turning to the right and crossing the left of the two bridges over the river. A short footpath a little way beyond, turning to the left past the hollow where the Japanese double-flowering cherries blossom in the spring, leads directly to the conservatories. The stag-horns are mostly in the central house, hanging in their baskets among the tips of the tree-ferns. A few young plants, offshoots from the large ones, have been detached and tacked against the greenhouse wall.

The large plants are grown imbedded in peat, with which the baskets are filled, and the young plants appear from time to time on the outside of the peat. These are merely taken off, together with a handful of the peat, fastened up somewhere, and the peat kept damp. There are a number of plants in the greenhouse, raised in this way, that are now as large as the

parent plants. In one of the side houses of the conservatories, opening out of the central house, a few plants of *A. Stemaria* and *A. angolense*, in various stages of development, are to be seen, side by side on a low bench, where they form a curious contrast to each other. Although *A. Stemaria* belongs to the antlered group of the species, its first little leaves are entire. They are so thickly coated with their starry scales that they have a hoary look, especially on the back and tip, not unlike that of young mullein leaves. Later this covering wears off more or less, and the fully grown fertile leaves are branched, thick, stiff, and leathery, with a smooth, highly polished, dark green upper surface only lightly dusted with the infinitesimal silvery stars. *A. angolense* is a very different looking plant. Each specimen bears one pair of sterile leaves and one of fertile. The pair of fertile are carried, as in all the stag-horns, directly in front of the sterile. They diverge slightly, rise a little, and then fold over and hang downward, strikingly like the flaps of the "elephant's ears." They are rather thick but pliable, with a bright green, conspicuously veined upper surface. The under surface has a pinkish-white woolly look, and the spore-bearing area appears first as a slightly raised merely deeper-hued spot. The sterile leaves are bright green both sides, and the veins visible, but veiled by a thin coating of slightly discolored scales, which gives them a russet or purplish aspect.

The photograph shown on plate CXII is taken of a section of the central house. It shows a plant of *A. Stemaria*, on the left, and gives a clear view of two plants of *A. grande*. The plants of the latter species are the largest of the stag-horns in these conservatories, and the most showy in general appearance, making the others appear dwarfed beside them. Their characteristic conspicuous sterile leaves projecting in masses above the baskets, with the fertile leaves hanging far below, can be seen from the illustration.

MARGARET SLOSSON.

NEW YORK BOTANICAL GARDEN.

SPRING LECTURES, 1913

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

April 5. "Explorations in Mexico—I. Veracruz to Jalapa," by Dr. W. A. Murrill.

April 12. "Botanical Observations of an Ornithologist in the Orient," by Mr. C. W. Beebe.

April 19. "Flowers for the Spring Garden," by Mr. G. V. Nash.

April 26. "Salient Features of Native Trees," by Dr. N. L. Britton.

May 3. "The Scenery and Flora of Colorado," by Dr. F. J. Seaver.

May 10. "Some Pacific Coast Seaweeds," by Dr. M. A. Howe.

May 17. "The Flora of the Rocky Mountains," by Dr. P. A. Rydberg.

May 24. "Botanic and Scenic Features of the Dells of the Wisconsin River," by Dr. A. B. Stout.

May 31. "Evergreens: Their Selection and Care," by Mr. G. V. Nash.

The lectures, which occupy an hour, will be illustrated by lantern-slides and otherwise. Doors closed at 4:00; late comers admitted at 4:15.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third avenue.

CONFERENCE NOTES

The February conference of the Scientific Staff and Registered Students of the New York Botanical Garden was held in the Laboratory of the Museum Building, February 3, Dr. Murrill presiding.

The program for this conference was as follows: Notes on the Flora of Tropical Florida, Dr. John K. Small; Photographs of

Fossil Plants, Illustrating Method Employed by the U. S. Geological Survey, Dr. Arthur Hollick; Preliminary Correlation of the Cretaceous and Tertiary Fossil Floras of Alaska, Dr. Arthur Hollick.

Dr. John K. Small gave a short description of recent botanical exploration in tropical Florida, referring especially to the Florida Keys. He spoke on the position and extent of the Florida Keys and their natural division into the Upper Sand Keys, Upper Keys, Lower Keys and Lower Sand Keys. These form a curved chain of islands which may be described as follows:

At the northeastern end of the chain are two sand islands, namely Virginia Key and Key Biscayne. These two bodies of sand are really mere detached portions of the slender coastal peninsula of sand-dunes extending along the eastern side of peninsular Florida. Seven miles south of Key Biscayne a second group of islands appears. These are composed of coral rock, and extend from Soldier Key, for a distance of about one hundred and twenty miles, to the West Summerland or Spanish Harbor Keys. The islands are for the most part greatly elongated and with the long axis in a curve following the general trend of the adjacent mainland. The third natural group of islands begins with No Name Key and Little Pine Key and extends in a westerly direction for a distance of about thirty miles, to Key West. The islands of this group are composed of Miami Limestone, and although irregular in shape, the long axis is nearly north and south, thus also differing from those of the previous group. The fourth group of islands lies to the westward of Key West and reaches well into the Gulf of Mexico. They are composed of sand. The Upper Sand Keys maintain, for the most part, a sand-dune and hammock flora which is related to that of the coastal peninsula north of them. The Upper Keys are naturally clothed with a dense hammock growth of tropical hardwood shrubs and trees, and palms; they closely resemble many of the Bahama islands. The Lower Keys are more varied in their vegetation, supporting large areas of pineland and palmland, as well as extensive hammocks. Their vegetation indicates close relationship to Cuba, and the pinelands are almost identical

with those of the Miami Limestone Region or Everglade Keys. The Lower Sand Keys are little more than sand-bars, and they support, like the ocean side of all the Florida Keys, only, or mainly, the characteristic strand-flora of most of the West Indies.

The whole chain is surrounded by tropical waters. The western extension lies in the Gulf of Mexico, while the inner side of the reef is bathed for its entire length with the same waters attenuated into the Bay of Florida, Blackwater Sound, Barnes' Sound, Card's Sound, and Bay Biscayne. The outer side of the reef is swept by the warm waters of the Gulf Stream. Thus we find here a tropical flora made up almost wholly of West Indian elements, and closely related to the floras of Bermuda, the Bahamas, and Cuba.

The results of recent exploration prosecuted on these tropical islands was illustrated with some of the specimens collected and summarized as follows: five undescribed species, one West Indian tree added to the arboreous flora of the United States, several West Indian herbaceous plants new to the flora of Florida, and about twenty-five species of flowering plants new to the Florida Keys.

Dr. Hollick, who could not be present, submitted papers which were read by the secretary of the conference.

In the first paper the various methods of illustrating fossil specimens were described and discussed and various examples of such work were displayed. These included pen and ink drawings, brush drawings and ordinary photographic work, all of which do not give the best of results and are for various reasons unsatisfactory.

Recently, however, a method has been employed by the United States Geological Survey which produces satisfactory pictures of almost any subject. The specimen is treated with ammonium chloride, by directing a fine spray, like a fog, over the entire surface, which is thus coated uniformly and evenly white. This eliminates all color interference, and by placing the specimen at an angle in a strong bright light every inequality appears either as a depression or an elevation, in clear, sharp

black and white, and a perfect photograph may thus be secured. The very finest veins are brought into view in this way, and features which are not visible to the unaided eye, in the specimen, are frequently clearly shown in the photograph. Photographs taken by this process were exhibited to the conference.

The following statements by Mr. Ridgway of the United States Department of Geology give in detail the method employed in securing these photographs: "The fine results obtained are largely due to the unusually good negatives made in our laboratory and to the superior quality of velox paper used in printing. Average and thin negatives are printed on 'Regular Velox' and intense negatives are printed on 'special Velox,' a paper made especially for the Survey. In regard to the method used for producing the vapor-coating on specimens: In carrying out the process now used, two small bottles containing the coating liquid are required. One contains hydrochloric acid, and the other ammonium hydrate. These two bottles are securely held together with a wooden yoke and glass tubes are inserted which connect them in such a manner that when blown into at one end the fumes of the two chemicals are united, forming chloride of ammonium salt, which is deposited on the specimen. After the specimen has been photographed this deposit, or coating, is readily removed by moisture of the breath."

In the second paper Dr. Hollick referred to the collections of fossil plants made by him in 1903 in Alaska, and those made subsequently by other parties in the employ of the United States Geological Survey, and to his recent work of arranging, studying and describing the specimens.

Heretofore no Cretaceous flora has been described from Alaska, and only a very few Tertiary species. The results of the recent work indicate the differentiation of at least two Cretaceous and two, or possibly three, Tertiary floras, representing several hundred species, a large number of which are new species.

Considerable difficulty was experienced in trying to correlate these floras, exactly, with known fossil floras from other parts of the world, for the reason that they contain so many new species

and, also, certain unique floral associations. They represent the time interval between the Lower Cretaceous and the Miocene Tertiary, and may be more or less satisfactorily correlated with the Great Falls, Dakota, Montana, Laramie, and Fort Union formations of the western states, the Lower Potomac and Raritan of the Atlantic coast, and the Komé, Lower Atané, Patoot, and Upper Atané beds of Greenland.

A. B. STOUT.

NOTES, NEWS AND COMMENT

The Garden recently received a collection of three hundred and seventy-five specimens of marine algae from Clare Island, Ireland, in continuation of exchanges with the Royal Gardens, Kew, England.

Messrs. David G. Fairchild and Walter T. Swingle, of the United States Department of Agriculture, recently made a visit at the Garden, especially inspecting the experiments in plant breeding now in progress in the experimental greenhouse.

The British Museum recently sent the Garden a large collection of the plants gathered in North America, chiefly in Mexico, during the earlier part of the last century, by Theodor Hartine. This valuable addition to our collections is now being mounted for the herbarium.

A Journal Club for the review of botanical literature has been organized recently at Columbia University for the benefit of the various botanical departments of the University, the New York Botanical Garden and the Brooklyn Botanic Garden. The Club meets twice a month.

The first number of the *Missouri Botanical Garden Bulletin* has appeared, beginning with January, 1913. The *Bulletin* is a monthly and will contain various items pertaining to the Missouri Botanical Garden that are of popular interest, especially to the residents of St. Louis.

The Executive Committee of the New York State Forestry Association, recently organized at Syracuse, held its first meeting at the New York Botanical Garden on March 15.

Dr. William Trelease spent a week at the Garden early in March studying the collections of *Quercus*. He was in Europe most of the winter, visiting various important herbaria.

Dr. E. P. Felt, state entomologist, spent March 7 at the Garden investigating the hemlock bark beetle and a destructive cactus insect which he recently described. During the same week, inspectors from Albany examined the hickory trees in the Garden with reference to the control of the hickory bark beetle.

At the annual meeting of the Botanical Society of America held in Cleveland during the Christmas holidays, Dr. Marshall A. Howe, curator, New York Botanical Garden, was elected vice-president of the Society for 1913. Dr. Arthur Hollick, curator, New York Botanical Garden, was reëlected treasurer of the Society, an office that he has held continuously since the organization of the original society in 1894 with the exception of a few months at the beginning when the secretary of the Society acted as its treasurer. Dr. Robert A. Harper, Torrey Professor of Botany in Columbia University, is one of the councilors of the Society for 1913. Among the new members elected at the Cleveland meeting were Dr. A. B. Stout, director of the laboratories, New York Botanical Garden, and Mr. Norman Taylor, curator, Brooklyn Botanic Garden. The next meeting of the Society will be held in Atlanta, Georgia, in December of the present year.

Mr. E. G. Arzberger, formerly on the botanical staff at the Ohio Agricultural Experiment Station, spent several days at the New York Botanical Garden during March.

Dr. H. H. Love, of the Cornell Agricultural Experiment Station, and Dr. George H. Shull, of the Station for Experimental Evolution at Cold Spring Harbor, have been recent visitors at the Garden

On March 6 the new Curator-in-Chief of the Brooklyn Museum of Arts and Sciences, Mr. William Henry Fox, visited the New York Botanical Garden in company with Dr. C. Stuart Gager, director of the Brooklyn Botanic Garden. Mr. Fox is a native of Philadelphia and a graduate of the University of Pennsylvania. He was secretary of the Department of Fine Arts at the St. Louis Exposition, was the director of the Herron Art Institute, Indianapolis, and went to Rome as assistant to the United States Commissioner at the Roman International Exhibition of Art and History (1911). He was appointed Curator-in-Chief of the Brooklyn Museum in January of the present year.

Mr. Aaron Aaronsohn, director of the Jewish Agricultural Experiment Station in Palestine, delivered an interesting address on "The Story of Wild Wheat and its Practical Development" at the American Museum of Natural History on the evening of February 15. The so-called "wild wheat," which Mr. Aaronsohn and certain specialists in the study of the Gramineae believe to represent the progenitor of the modern cultivated wheats, is said to be the dominant wild plant of thousands of acres on the slopes of Mt. Hermon in Palestine. It flourishes in a region where the rainfall is only five or six inches a year, while the cultivated wheats require a minimum of about fourteen inches to mature a crop of grain. Experiments in hybridizing are being made with the hope of obtaining a wheat that shall combine the adaptability of the wild wheat to a dry climate with the essential characteristics of the wheats of economic value.

Messrs. David G. Fairchild and Walter T. Swingle, of the Bureau of Plant Industry of the United States Department of Agriculture, were present and spoke of the importance of the work of the Jewish Agricultural Experiment Station to American agriculture and especially of what it would mean to develop a variety of commercially valuable wheat that could be grown in parts of the western United States where a successful culture of wheat is now impossible on account of a scanty rainfall.—M. A. H.

A conference to discuss the control of the hickory bark-borer was called by the Commissioner of Agriculture at Albany on February 24. This conference was attended by the principal entomologists and mycologists in the state, and the following resolutions, prepared by Messrs. Merkel, Levison, Deming, Felt, Herrick, Parrott and Murrill, were unanimously adopted:

WHEREAS, The hickory bark-borer is at present extremely injurious and destructive to hickory trees in and around New York City, and has already destroyed and is threatening the destruction of thousands of valuable trees; and

WHEREAS, It has been demonstrated in several instances on a large scale that the hickory bark-borer can be practically controlled; therefore, be it

Resolved, That we hereby respectfully request the Commissioner of Agriculture to take such steps as may be necessary to bring about the enforcement of the provisions of the agricultural law relative to insect pests and diseases, with particular reference to control of the hickory bark-borer; and be it further

Resolved, That the thanks of the conference are hereby tendered to Commissioner of Agriculture Huson for his courtesies and for the calling of this conference.

The New York Botanical Garden was represented at this conference by Dr. Murrill, who reported the loss of several hundred fine hickory trees. It is probable that a concerted movement will be made at once to prevent the further ravages of this insect in the vicinity of New York City by cutting out all hickory trees now infected. The beetle is native and widespread, but it does not exist in any other section, so far as we know, in such numbers as to cause an epidemic. Nut growers have become aroused in this matter because, the chestnut tree having been destroyed, many of them had begun to turn their attention to the growing of the hickory, and efforts have been made to introduce hardy varieties of the pecan. The value of the annual importation of the nuts in the United States approximates $15,000,000, and it is believed that much of this money may be kept within the country if the proper means are taken to develop our own native species of nut-bearing trees.

The hickory tree is not only valuable for the nuts it produces, but also for shade and for lumber. If used immediately, the attacks of the bark-borer do not seriously injure it, but the wood is very perishable when left standing. Dead trees soon become useless and they also cease to be a menace as sources of infection, as the insects leave them after they are killed. The fact that both the larval form and the mature form of this insect may be destroyed in the affected trees during the winter season, or before the beetles escape in the spring very much simplifies the matter of control. It has been repeatedly proven that by cutting out all infected trees in a given locality the number of insects may be so reduced as to fall an easy prey to their natural enemies.

It is the plan to publish a more complete account of the hickory bark-borer in the June number of the JOURNAL.—W. A. M.

Spring is making an early start, as manifested by the unusually early appearance of the flowers. A walk around the grounds of the Garden on March 18 disclosed the following early comers:—the common crocus, *Crocus vernus*, of Europe, and that one known as cloth-of-gold, *C. Susianus*, of Asia Minor, the latter having been in bloom for over a week; the common snowdrop, *Galanthus nivalis*, and the giant snowdrop, *G. Elwesii*, practically in constant bloom since January; the glory-of-the-snow, *Chionodoxa Luciliae*, its flowers of glorious blue just appearing.

Among the shrubs *Pieris japonica* is one of the first to make its appearance. A clump of these in the west border, near the Woodlawn Road abutment, is full of slender racemes of white flowers. The hazel-nuts are among the first of the shrubs to break into flower, and this year they are a little earlier than usual. Two American forms, *Corylus americana* and *C. rostrata*, with the European *C. Avellana*, are now in full bloom, their tassels dancing in every wind. The common alder of our swamps and pond-sides, *Alnus serrulata*, is in full tassel, and the "pussies" on *Salix discolor* and on the osier willow, *Salix viminalis*, are just creeping out. One of the showiest shrubs, quite marked in

its profusion of small yellow flowers, is *Cornus officinalis*, of China and Japan, known to the Japanese as sandzaki. Two specimens are in the fruticetum collection. Another related species is *Cornus Mas*, of southern Europe, known as the Cornelian Cherry. This is just opening its flowers, but is not as showy as the other.

At conservatory range 1, in house no. 4, *Medinilla magnifica* is again in its annual raiment of pink, its handsome clusters of pendulous flowers making it the most striking object in that house. This is readily propagated from cuttings, and it is well worth more general cultivation. In house 5 the aloes are still in bloom, and also many of the orpine family. *Fouquieria formosa*, alluded to in a previous journal, is still in full bloom in no. 6. In house 12 *Coelogyne cristata*, an orchid from the Himalayas, is a sheet of white. In house 13 the sweet orange, *Citrus aurantium*, is just opening its sweet-scented blossoms, and the lovely blossoms of the Cherokee rose still add a charm to this house.—G. V. N.

Meteorology for February.—The total precipitation for the month was 2.91 inches. Maximum temperatures for each week were as follows: 41° on the 4th, 41° on the 9th, 51° on the 15th, and *60° on the 20th.* The minimum temperatures were 12° on the 7th, *9° on the 13th*, 17° on the 18th, and 13° on the 26th.

ACCESSIONS

MUSEUMS AND HERBARIUM

377 specimens of marine algae, chiefly from Ireland. (By exchange with the Royal Gardens, Kew, England.)

2 specimens of mosses from Staten Island. (By exchange with Dr. A. J. Grout.)

1 specimen of spent *Zamia*. (Given by Mr. A. B. Hursh.)

448 specimens of hepaticae, mostly from California. (Given by Miss Caroline C. Haynes.)

1 specimen of fungus from Wyoming. (By exchange with Professor Aven Nelson.)

10 specimens of mosses from South Dakota. (By exchange with Professor S. S. Visher.)

9 specimens of mosses from Cuba. (By exchange with Brother Leon.)

49 specimens "Musci Europaei exsiccati," series 18. (Distributed by Dr. Ernst Bauer.)

100 specimens "Kryptogamae Exsiccatae," century 20. (Distributed by the Royal Natural History Museum, Vienna.)

120 specimens from Yucatan and Vera Cruz. (By exchange with the Field Museum of Natural History.)

1 museum specimen of prickly pear tubers. (Given by Mr. C. F. Sulzner.)

50 specimens "Phycotheca Boreali-Americana," fascicle 35. (Distributed by Messrs. Collins, Holden, and Setchell.)

23 specimens of ferns from Brazil. (Given by the Herbarium of Prince Roland Bonaparte.)

8 museum specimens of drugs. (Given by Dr. H. H. Rusby.)

1 specimen of lichen from the Yellowstone National Park. (Given by Miss Julia T. Emerson.)

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EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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WILD AZALEA

JOURNAL

OF

The New York Botanical Garden

VOL. XIV April, 1913 No. 160

WILD PLANTS NEEDING PROTECTION*

6. "WILD AZALEA" (*Azalea nudiflora* L.)

WITH PLATE CXIV

About the end of May, when the snow-balls are in bloom and the dandelions have gone to seed, with their exquisite balls of fruit standing up tall among the grasses and buttercups; when the wild cherries scent the air with their bitter-sweet fragrance, then the wild azaleas brighten the gloom of the woodlands with their exquisite colors. In the region about New York City, it is known as "wild honeysuckle" from the shape of its flowers, which have a long tube filled with nectar. The flowers vary in color from pale pink to deep rose-color and grow about ten in a cluster at the summits of long naked branches, which usually arise in clusters from the stem. These shrubs sometimes attain a height of from two to six feet, and once were abundant in open woodlands in Greater New York, particularly in the Bronx and on Staten Island, though on account of their showy color and fragrance they are often ruthlessly broken. The flowers are large with long exserted stamens and with the tube, the pistil and the filaments darker-colored. The 5-parted limb of the corolla is unequally lobed, the two upper divisions spreading, the lowest being the broadest and overlapping the two narrower lateral ones. The pedicels and tube are quite hairy as well as the short green calyx. The ovary also is hairy and the style is over two inches long, curved upward and terminating in a disc-

* Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.
[JOURNAL for March, 1913 (14: 63–78) was issued March 29, 1913.]

shaped stigma. The five long stamens are inserted with the corolla at the base of the tube, and a deep hairy groove extends down the center of each lobe of the corolla to the nectar, at its base. The leaves are oval or obovate, tapering to a short petiole and unequal in shape and size; usually five to seven are borne at the summits of naked branches, like the flowers forming an unsymmetrical rosette.

Azalea nudiflora was described by Linnaeus in 1762 in the second edition of his "Species Plantarum" and he cites Peter Kalm's description. In Kalm's travels under the date of May 5, 1749, he says: "Early this morning I went to Rapaapo, New Jersey which is a great village, inhabited by Swedes. . . . The Mayflowers, as the Swedes call them, were plentiful in the woods wherever I went to-day; especially on a dry soil, or one that is somewhat moist. The Swedes have given them this name, because they are in full blossom in May. Some of the Swedes and the Dutch call them Pinxterbloem (Whitsunday flowers) as they really are in blossom about Whitsuntide. The English call them Wild Honeysuckles; and at a distance they have some similarity to the Honeysuckle, or *Lonicera*. Dr. Linnaeus, and other botanists, call it an *Azalea*. Its flowers were now open, and added a new ornament to the woods, being little inferior to the flowers of the Honeysuckle and *Hedysarum*. They fit in a circle round the stem's extremity, and have either a dark red or a lively red color; but, by standing for some time, the sun bleaches them, and at last they get a whitish hue."

This species ranges from Maine to Florida and Texas, ascends to 3,000 feet altitude in Virginia and has been reported from Canada. About forty species of *Azalea* have been described from North America and Asia, many have been cultivated for their beauty, and many hybrids are known. Seven species are known to grow in the United States, of which the orange-colored *Flame Azalea* of the Southern States is the showiest and the *White Swamp Azalea* the most fragrant. The Heath Family or *Ericaceae*, to which they belong, includes about fifty-five genera and one thousand and fifty species, widely distributed, mostly in cool temperate regions in which the Laurel and Rhododendrons are

our most familiar and exquisite members of this most charming family of plants.

ELIZABETH G. BRITTON.

REPORT ON EXPLORATION IN TROPICAL FLORIDA

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF,

Sir: According to your instructions I left New York for tropical Florida on the first day of last November. I proceeded direct to Miami, where by prearrangement I met Professor Hugo de Vries, of the University of Amsterdam, Holland, and there communicated to him your invitation that he be a guest of the Garden during his sojourn in southern Florida. Professor de Vries had become interested in the discoveries made through our systematic exploration of subtropical and tropical Florida and the West Indies as described in the various reports on exploration heretofore published in this JOURNAL. He wished to see personally some of the vegetable and animal phenomena of that region.

Before entering upon our field work, Mr. Edward Simmonds, who is in charge of the Subtropical Garden of the United States Department of Agriculture at Miami, kindly placed the laboratory building of that station, and its facilities, at our disposal for a working and collecting headquarters. I wish to thank Mr. and Mrs. Simmonds for doing all in their power to promote our botanical work about Miami. I wish to particularly thank Mr. C. F. Sulzner, of Miami, and his family, for numerous courtesies, and for the almost constant use of his motor-boat and automobile, and especially for companionship in the field. The intimate knowledge both of the land and of the waters of Bay Biscayne and the vicinity, possessed by Mr. Sulzner, was of great value to us in economizing time and saving trouble. Through Mr. Sulzner's coöperation Professor de Vries was enabled to see with but little discomfort many points of interest in a comparatively short time.

Our first examination of the Everglades was made through the Miami drainage canal. This dredged channel enters the

Everglades at the source of the west fork of the Miami River, and runs in a northwesterly direction for many miles. The canal has brought about the draining of the Everglades adjacent to it. For the most part it is cut through the white limestone and its overlying deposits which seem to consist chiefly of areas of varying extent of sand, marl, or peat. The banks of pure limestone which are thrown up on both sides of the canal by the dredge rapidly develop a luxuriant plant covering. Herbaceous plants of many families and morning-glory vines often completely hide the rock, while in other places shrubs, such as the common-elder, the cocoa-plum, the Florida trema, and the tree-potato grow in dense masses. The most noteworthy fact, as well as the most conspicuous phenomenon, in this connection is this: that banks of pure limestone are able to develop within a few months' time, and maintain apparently with increasing vigor, such a luxuriant growth of herbaceous plants and shrubs.

The waters of Bay Biscayne were examined for their plant and animal forms both by means of a water-glass from the boat, and by wading. Much to interest Professor de Vries was found on the shores of Virginia Key and Key Bay Biscayne in connection with their tropical vegetation.

A few heavy rainstorms and rather persistent strong north winds interfered to some extent with our movements.

The several visits of Professor de Vries to the Subtropical Garden already referred to were particularly interesting to him on account of the original ideas of Mr. Simmonds and their application in connection with plant propagation and culture. Successive days were devoted to visits to the homes of Mr. John Soar and Mr. Charles T. Simpson near Little River, of Dr. Russell N. Nevins near Miami, and of Dr. John Gifford and Mr. Kirk Monroe near Cocoanut Grove. I wish to thank these gentlemen for kindly showing Professor de Vries things of interest on their respective preserves.

A day was spent in the vicinity of what was at one time Camp Longview, in order to see the Everglades in their natural condition. The contrast caused by the evolution of conditions in this homestead country from absolute wilderness to relative

civilization within a few years was here particularly striking. When we first explored this region, less than ten years ago, Camp Longview like other similar survey stations, and even less remote points, was in the midst of a wilderness, and several days distant from Miami, only accessible by obscure trails through water and over rocks in the forests broken here and there by narrow arms of the Everglades. Today these points are nearly all under cultivation and easily accessible within a few hours time by both the main line of the Florida East Coast Railway and the finest roads in the world.

The last day of Professor de Vries' sojourn in the Miami region, the weather being somewhat favorable, was spent in examining the phenomena and life at Cape Florida and on and about Soldier Key. There we first found coral growing in position, although the sea was too rough to permit of an examination of the more interesting coral-beds on the outside of the reef. Stormy weather also prevented a good view of the so-called "sea-gardens" about Bay Biscayne Key, and only after Professor de Vries' departure, on a calm day, did we find the patches of beautifully branched corals growing outside of Baer's Cut below Miami.

About the middle of November I accompanied Professor de Vries to Key West. Observations, and collections of plants, were made at various points toward the eastern end of that island. Among the specimens collected there are many representatives of the same species found on the island in the early part of the last century by Dr. Blodgett who then resided on Key West. Dr. Blodgett was the pioneer botainst of that region and the most thorough collector of the flora of Key West. The specimens Dr. Blodgett collected there, and which are preserved in the herbarium at the Garden, form the foundation of our knowledge of the flora of Key West. Without it, our knowledge of the native plants of the island would be rather incomplete, for subsequent destruction of many of the original hammocks seems to have obliterated all traces of some of the more interesting West Indian plants that grew there. However, our recent collections on the island indicate that there are interesting discoveries awaiting a more detailed research.

At Key West Professor de Vries and I separated. When Professor de Vries took the boat for Cuba, I proceeded to Big Pine Key. Upon reaching this island I encountered an epidemic of mosquitoes which made existence almost impossible. However, with occasional periods of relief in the breezes along the beach, I managed to make a large collection of the plants growing in the interior of the island. Several species new to science were found in the pinelands and also some West Indian plants not before collected in the United States.

Your communication relative to the collecting of the seeds of characteristic plants of the Everglade Keys for experimental purposes in Bermuda awaited me at Miami upon my return from Key West and Big Pine Key. A week was devoted to securing the desired seeds, and the accompanying herbarium specimens, from within a radius of about 6 miles of Miami, with the exception of one day on which a remarkable rainstorm came up from the tropics, and during which high winds also prevailed. Nearly eight inches of rain fell during the day! This deluge brought about a condition of high water in the Everglades and prairies, so that collecting in that region was made impossible for some weeks. Beginning with the following week collections were made in the vicinity of a canal recently dredged through the mangroves and sand-dunes between Bull's Island and the head of Indian Creek on the peninsula opposite Miami. The flora of the hitherto inaccessible parts of the Mangrove-formation was very interesting, and the growth of the various halophytes with their several shades of green on the recently excavated sand of the canal-banks was luxuriant beyond anything I had before observed. As in the case of the banks of the Miami drainage canal, the recently made banks of pure lime-sand supported an exceptionally luxuriant growth of plants. Following this, a canal recently dredged from Snapper Creek prairie to the bay was investigated. These new channels through land hitherto not easy of access always show phenomena of special interest and yield good results in the way of collections of specimens.

A four days' expedition to Big Pine Key and the neighboring keys was planned, but stormy weather defeated its accomplish-

ment. As an alternative Boca Chica Key was selected for investigation. Many desirable specimens were gathered on this little-known island, and among them was a West Indian tree not before found in the United States.

Several excursions were made by boat some miles into the Everglades where specimens of peat were secured for our economic museum. Then the sand-dunes along Indian Creek were visited for the purpose of making certain observations, and for securing specimens of the rare *Okenia hypogaea* mentioned in a previous report, and whose growth on the occasion of other visits had been obliterated by hurricanes or heavy storms. The plant was now found in perfect condition of growth, and specimens ranging from seedlings to full-grown plants were obtained. This plant belongs to the four-o'clock family and is elsewhere known only from southern Mexico. It is a trailing or creeping vine, and like the peanut, pushes its flowers into the sand by means of the recurving and elongating flower-stalks, and then matures its fruits about six inches beneath the surface of the soil. A surprising discovery was made relating to its flower. The calyx is generally bright rose-purple, and the flowers of the seedlings are one to one and a half inches in diameter, while those of the grown plants are uniformly less than a half inch in diameter. There too we secured museum specimens of the apparently edible tubers of the prickly pear, *Opuntia austrina*, a species of cactus discovered in that region several years ago.

I returned to the Garden at the end of the first week of December with the results of the expedition which may be briefly stated as follows: Numerous field observations the accomplishment of which had become desirable through the study of collections previously made in tropical Florida, a dozen museum specimens which we had not been able to obtain on previous expeditions, and a collection of approximately eighteen hundred herbarium specimens representing about three-hundred and ninety-six field numbers. In the latter named collection are five species new to science, one tree new to Florida and at the same time new to the tree-flora of the United States, several West Indian plants new to the flora of Florida, and about twenty-five species new to the flora of the Florida Keys.

Our collections from the Florida Keys are very interesting and valuable in themselves, but even more interesting in connection with the observations made there, in indicating what discoveries await a more concentrated search under favorable weather conditions, freedom from insect pests, and proper means of transportation.

Respectfully submitted,

J. K. SMALL,

Head Curator of the Museums and Herbarium.

THE CEDAR OF LEBANON

A magnificent example of this interesting tree, on the estate of Mrs. Collis P. Huntington, at Throgg's Neck, N. Y. City, is shown in the accompanying illustration. This specimen is in full vigor, although over one hundred years old, standing sturdy and strong, with many years of life before it, unless the hand of man should cut short its career. This tree is about seventy-five feet tall, with a maximum spread of branches of about sixty-five feet. The branches have a peculiar flat shape, giving a sort of terraced effect to the foliage. Judging from illustrations, the tree on the Huntington estate equals, if it does not exceed, in beauty and dignity any of those in cultivation in Europe. Imagine the dark green foliage, the tall straight trunk over four feet in diameter, and the broad spreading branches extending to the ground, and you have a picture of this tree as it now is. It has stood there for one hundred and twenty-three years, having been brought to this country, so the story runs, from Palestine, in 1790, by Philip I. Livingston, the former owner of the present Huntington estate, and a great lover of the choice in horticulture in his day. Then but a small tree, it has flourished in its present site until it now bears the reputation of being the finest specimen in this country. There are other smaller trees in Central Park and Prospect Park. Another was planted at Woodlawn, near Princeton, N. J., by the late Judge Field in 1842. This was thirty-six feet high in 1859, and thirty years later it had attained a height of fifty-four feet and a trunk diam-

Cedar of Lebanon standing on the estate of Mrs. Collis P. Huntington, Throgg's Neck, New York City.

eter of a little over two feet. Another fine specimen was on the grounds of the old Prince Nursery at Flushing, N. Y., which in 1889 was about sixty-five feet high.

This would seem to indicate that this tree is hardy from the latitude of New York City south. Perhaps it is the favorable location of the trees at Throgg's Neck and Flushing near the waters of Long Island Sound which may account for their vigorous growth and long life, but an effort to cultivate it in this vicinity would certainly be worth while. Its magnificent proportions, as shown in the illustration, would make it a desirable acquisition in any park.

The specific name *Libani* refers to Mt. Lebanon, with which this tree is associated in biblical history. For centuries it was believed to be confined to the Kedisha valley at an elevation of about 6,000 feet. This valley is about fifteen miles from the Syrian port of Beirut. Many travellers from western Europe had visited this valley in the few hundred years past, the reports brought back by them indicating a gradual diminishing of the number of trees. A scientific investigation of the conditions at Mt. Lebanon was finally undertaken in 1860 by Sir J. D. Hooker. He found that there were about four hundred trees in the valley, covering an area some twelve hundred feet in diameter, with one or two outstanding trees not far from the rest. They formed nine groups located on as many hummocks of the moraine on which they occur. They varied in size from six inches to thirteen feet in diameter. The smallest trees he was able to find were of the small diameter mentioned above, indicating that favorable conditions for the germination of the seed must occur at great intervals.

Since that time many other localities have been discovered, and it is now known to occur commonly on Mt. Lebanon, chiefly on the western slopes, in detached groves, in some cases comprising several thousands of trees. Vast forests of it are also known on the higher slopes of Mts. Taurus and Anti-Taurus in Cilicia. Here it grows between 3,000 and 6,000 feet altitude, occurring at the lower elevations with *Abies cilicica*. In 1897 Walter Siehe, in a report upon the conifers of the Cicilian Taurus,

says that the Cedar of Lebanon occupies the higher slopes where snow lies several feet deep for nearly five months of the year. The forests, he further relates, are of impressive grandeur, the intense stillness only broken from time to time by the cry of the alpine crow, or by the crash of a mighty boulder, started in its descent by the passing of some wild goat. He reports the wood as highly prized in that region, being strong, and possessing the quality of exposure to the weather without warping. It is also fragrant and free from the attacks of insects. It is used for the interior woodwork of the Greek churches, and for the manufacture of the better kinds of household furniture. This is exactly the reverse of the opinion held of the wood of these trees grown in England, where it is reported as "light, soft, brittle, apt to warp and by no means durable." This difference may be due to environment, the greater altitude and the presence of the snow blanket in its native home accounting for it.

That this is the cedar of Lebanon of the Bible there seems some doubt, for those on Mt. Lebanon are some fifteen miles from the coast, so that they could have been transported to Jerusalem only with the greatest difficulty and expense. Be this as it may, during the sixteenth century it became the custom to make pilgrimages to the cedars of this mountain. The pilgrims carried away so much wood for the construction of crosses and tabernacles that the religious authorities of that time put a stop to it by threatening excommunication to any one who injured the trees. The rigor of this edict was only remitted on one day in the year on which was celebrated the Feast of the Cedars, when an altar was built under one of the largest and oldest trees.

The cedar of Lebanon was introduced into cultivation in England about 1683, according to Aiton, when the trees were planted in the Chelsea Botanic Gardens. Its first appearance in France was in 1734, when a tree was planted in the Jardin des Plantes. If report be true, its first introduction into this country was in 1790, by Philip I. Livingston, as indicated at the beginning of this article.

Here at the Garden we have under cultivation in the pinetum two of the three known species of the genus *Cedrus*. These are

the Mt. Atlas cedar, *Cedrus atlantica*, of northwestern Africa, and the Deodar or Indian cedar, *Cedrus Deodara*, of the Himalayan Region. Specimens of both will be found on the ridge in the vicinity of the economic garden, but a short distance southeast of the museum building.

May this noble specimen of the Cedar of Lebanon, now standing in stately dignity on the Huntington estate, the beloved and prized of all tree-lovers, be preserved to us for many, many years. Its destruction would be not only a loss to its immediate neighborhood, but to the whole city and the country wide, for a tree of this kind has much more than a local interest. All tree-lovers know of this wonderful specimen, and value it as one of the choicest and rarest representatives of arboreal vegetation in this country.

GEORGE V. NASH.

CONFERENCE NOTES

The conference of the scientific staff and registered students of the New York Botanical Garden for the month of March was held in the main laboratory on March 3.

Professor R. A. Harper gave a preliminary report of the experiments in corn breeding which he conducted at the Garden's experimental plot during the past summer. A large number of ears which were obtained were displayed to show the various phenomena associated with xenia. The results were discussed especially in relation to unit-characters, dominance and segregation.

Dr. Marshall A. Howe spoke of "The Marine Algae of Peru," his remarks being based upon a collection of algae made in Peru by Dr. Robert E. Coker, of the United States Bureau of Fisheries, and sent to the Botanical Garden for determination. The collection includes about one hundred species, of which a considerable number appear to be undescribed. Several of the other species obtained have apparently not been reported except from the original collections made from fifty to ninety years ago. It was remarked that although Peru lies wholly within the tropics

its marine flora is essentially of a temperate character and not at all tropical in the usual sense of that term. It appears that the Humboldt current brings the cold waters of the South Temperate and Antarctic regions northward along the western coast of South America and that the nearly constant temperature of the Peruvian ocean may be compared to the summer temperatures of the Atlantic at New York or of the Pacific at Monterey, California. The larger, more conspicuous seaweeds are kelps, closely related to species that occur on the coasts of California, Oregon, and Washington. Most of the specimens exhibited and discussed by the speaker belonged to the class known as the brown algae.

NOTES, NEWS AND COMMENT

Dr. Beverly T. Galloway, who for the past twelve years has been Chief of the Bureau of Plant Industry, has been appointed assistant secretary of agriculture.

Messrs. David Fairchild, Walter Swingle and O. F. Cook of the Bureau of Plant Industry spent March 6 at the Garden, where they inspected the collection of palms and the plants which are being grown in the experimental work in plant breeding.

Dr. E. A. Burt, professor of natural history in Middlebury College, Middlebury, Vt., has been appointed librarian and mycologist of the Missouir Botanical Garden. The appointment will date from next September.

Dr. Alexander W. Evans, Eaton professor of botany in Yale University, visited the Garden on March 25 to consult the Mitten collection of Hepaticae.

Bulletin no. 29 of the New York Botanical Garden appeared March 18. This bulletin contains the annual report of the Director-in-Chief with other official documents pertaining to the Garden.

Professor L. H. Pennington, of Syracuse University, spent several days during the Easter vacation in the Garden herbarium for a continuation of his studies of the genus *Marasmius*. Miss Gertrude Burlingham also spent some time examining specimens of the genus *Russula*. The results of the studies on these genera will appear in the next part of "North American Flora" dealing with fleshy fungi.

The Garden has recently received nearly 1,000 specimens of fungi from Mr. Lars Romell, of Stockholm, Sweden. Mr. Romell is probably the best authority on the fleshy fungi of northern Europe. During the past summer he has been collecting higher fungi in the vicinity of Femsjo, in southern Sweden, where Elias Fries spent his early life and did much of his most careful and important work on fungi. The specimens recently received from this region are a valuable addition to the herbarium.

Dr. N. L. Britton, director-in-chief, Mrs. N. L. Britton and Miss Delia Marble sailed for New York City from the West Indies on April 12. Dr. J. A. Shafer, who accompanied Dr. Britton on the recent explorations, returned to New York City, April 3, bringing various collections for the New York Botanical Garden. Dr. J. N. Rose, who participated in the expedition, has already returned to Washington, D. C. An account of these explorations will appear in a future number of the JOURNAL.

Dr. C. F. Millspaugh, curator of botany in the Field Museum of Natural History at Chicago, spent several days at the Garden in April identifying botanical specimens.

Mr. John F. Cowell, director of the Buffalo botanic garden, and Mr. John Dunbar, assistant superintendent of parks, Rochester, N. Y., visited the Garden, and spent a day inspecting the hardy collections of shrubs and trees. The collection of

conifers at Highland Park, Rochester, under the care of Mr. Dunbar, is one of the finest in this country.

The Third National Flower Show was held at the New Grand Central Palace, in this city, from April fifth to thirteenth, the last day an extension of time in compliance with the demand for further opportunity to visit this wonderful exhibition. It was the largest flower show ever held in this city, if not in this country, and the management deserves great credit for bringing it to so successful a termination. It was broad in its scope, plants and flowers of many kinds being on view. A large collection of Australian acacias, graceful in form and delightful in color, was a feature. Large exhibits of orchids, representing many thousands of dollars, formed an important part. Foliage plants, including palms, ferns, dracaenas, cycads, and many others were there in abundance. One of the greatest features was the immense number of roses, magnificent specimens, in the opinion of experts the finest ever shown. One vase of Killarney Queen was a triumph of the horticulturist's art, with its long stems, six to seven feet, clothed with rich foliage, and bearing blossoms fully six inches across when fully blown. A large pyramidal group of roses, containing about 2,200 blossoms of several kinds, was the admiration of all. Nothing like it had ever been seen in this city. Carnations and sweet peas were there in great abundance, and hundreds of pots of bulbous plants, including hyacinths, tulips, and daffodils, added the charm of their brilliant colors.

The attendance was large, night and day. Many of the visitors were prominent socially and indicated their great interest in horticulture by more than one visit. The great interest of the influential people of this city in matters pertaining to horticulture was made abundantly evident. It is to be hoped that New York has come into her own in matters horticultural, and that the success of this great exhibition means a great awakening in this art, not only in this city, but elsewhere in the country.—G. V. N.

The Forsythias in various parts of the grounds are unusually fine this spring, especially those in the fruticetum, where some specimens of *F. intermedia* measure about eighteen feet across. These plants are aglow with their clothing of yellow. Besides *F. intermedia*, of which there are several specimens in the fruticetum, three others are to be found there: *F. suspensa*, with its long drooping branches, the individual flowers on long stalks — a particularly effective plant to train up a post at the corner of a porch; *F. Fortunei*, of a lighter color than *F. intermedia*, and with the flowers more scattered; and *F. viridissima*, in habit much more compact than the others, with deep yellow flowers which are curiously reflexed, giving the plant an appearance quite different. For gracefulness and abundance of flowers *F. intermedia* is the best. This is a hybrid between *F. viridissima* and one of the forms of *F. suspensa*.

The crocuses are gone, and the daffodils and tulips are coming to take their place. There are so many forms of both of these that we will have them with us for several weeks, way to the end of May.

In the arboretum the weeping cherries are in full bloom, as are the Japanese rose-bud cherries, *Prunus subhirtella*. The Japanese cherries have their buds well along, and a warm spell, after the abundance of rain, will bring them into bloom with a rush. Their dainty blossoms are borne in great profusion, and the collection of Japanese cherry trees, in the vicinity of conservatory range 2, is one of the features at this time of the year.—G. V. N.

Meteorology for March.—The total precipitation for the month was 4.97 inches. Maximum temperatures for each week were as follows: 68° on the 0th, 55° on the 14th, 66° on the 21st, and *78° on the 25th*. The minimum temperatures were *14° on the 7th*, 27° on the 12th, 27° on the 18th, and 25° on the 29th. In the thirty hours between 10:00 P.M. of the 7th and 4:00 A.M. of the 9th, there was a rise in temperature of 54°.

ACCESSIONS

MUSEUMS AND HERBARIUM

26 specimens of mosses from France. (By exchange with Brother Leon.)

1 specimen of "light-wood" from South Carolina. (Given by Miss Alice Donlevy.)

1 specimen of *Viola emarginata* from South Carolina. (By exchange with Dr. Thomas P. Bailey.)

469 specimens of flowering plants from Missouri and Arkansas. (Collected by Mr. B. F. Bush.)

1 specimen of hepatic from Wyoming. (By exchange with Professor Aven Nelson.)

7 specimens of ferns from Brazil. (By exhcange with the Herbarium of Prince Roland Bonaparte.)

75 specimens of American mosses from the Herbarium of Leo Lesquereux. (From the University of Neuchâtel, Switzerland.)

60 specimens "Algae Adriaticae Exisccatae" fascicles 1 and 2. (Distributed from the Royal Zoological Station, Triest.)

22 specimens of flowering plants from Louisiana. (By exchange with Professor R. S. Cocks.)

9 specimens of drugs. (Given by Dr. H. H. Rusby.)

289 specimens of flowering plants and ferns from North Carolina, South Carolina and Florida. (By exchange with Dr. John W. Harshberger.)

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COOKE, MORDECAI CUBITT. *Freaks and marvels of plant life.* London, 1882. (Given by Mr. Herbert A. Brooks.)

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MILLER, THOMAS. *Common wayside flowers.* London, 1880. (Given by Mr. Herbert A. Brooks.)

MOLISCH, HANS. *Leuchtende Pflanzen.* Ed. 2. Jena, 1912.

MÜLLER, KARL. *Musci venezuelenses Fendleriani.* Berolini, 1879. (Given by Mrs. N. L. Britton.)

MURRAY, ANDREW. *The pines and firs of Japan.* London, 1863.

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Vol. 9, parts 1 and 2, 1907; part 3, 1910. Polyporaceae—Agaricaceae (pars). (Parts 1 and 2 no longer sold separately.)

Vol. 16, part 1, 1909. Ophioglossaceae—Cyatheaceae (pars).

Vol. 17, part 1, 1909; part 2, 1912. Typhaceae—Poaceae (pars).

Vol. 22, parts 1 and 2, 1905; parts 3 and 4, 1908. Podostemonaceae—Rosaceae (pars).

Vol. 25, part 1, 1907; part 2, 1910; part 3, 1911. Geraniaceae—Burseraceae.

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OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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JOURNAL

OF

The New York Botanical Garden

VOL. XIV May, 1913 No. 161

WILD PLANTS NEEDING PROTECTION*

7. "PINK MOCCASIN FLOWER" (*Cypripedium acaule* Aiton)

WITH PLATE CXVI

From the middle of May to the middle of June the "Stemless Pink Moccasin" or "Two-leaved Lady's Slipper" may be found blooming in moist woods and on the borders of swamps or on drier hillsides in pine woods. It comes when the orchards are in bloom, beginning with the violets, anemones and wake-robins and in colder, more northern, hilly regions may still be found when the laurel and the roses are just unfolding.

It is probably the most common of all the *Cypripediums*, having the greatest range, extending through British America from Newfoundland to Winnipeg and North West Territory, and is even supposed to have been one of the species recorded by Dr. Richardson from Arctic America. It also occurs sparingly in the United States from Minnesota to Kentucky and Tennessee.

The flower is large and showy, pendent on a long stalk, about a foot high, with two large basal leaves: they taper down to and clasp the base of the flower stalk and are in turn enclosed in a thin brown bract; there are five prominent parallel veins and both surfaces of the leaf are pubescent with short glandular hairs. Arching over the flower at the top of the scape is a single lanceolate bract, about 2 inches long, covering the ovary

* Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

[JOURNAL for April, 1913 (14: 79–95), was issued April 26, 1913.]

which is curved, strongly ribbed and glandular hairy; the large brown calyx is composed of two united sepals, the two lateral petals also are brown, narrow and twisted. The lip is a large showy pouch, 2–3 inches long, of a bright purplish pink color veined with darker lines, it is deeply split above with the aperture closed by the downward and inward curving of the sides; there are also minute short glandular hairs on the outside, but within the hairs are white and longer, becoming rigid and bent downward as they approach the anthers, serving to attract and direct the movements of insect visitors who come in search of nectar. When the insects reach the anthers, the two viscid sacs adhere to their backs and are thus carried off to some other flower, where they are brushed against the roughly papillose stigma and thus accomplish cross-fertilization. One sterile stamen is expanded into a heart-shaped bract, which is bent downward and inward covering the stigma and effectually preventing all exit, except by the apertures on each side of the anthers. The capsules when mature, are large, about 1–1.5 inches long and produce numerous small seeds, but they are nowhere very abundant, as the very showiness which insures fertilization by insects, defeats its object through the greediness of children and some selfish older people, who pick all they can find no matter how few there may be!

Cypripedium acaule was named by Aiton in a catalogue of the plants grown at Kew in 1789 from plants introduced by Wm. Hamilton, Esq., in 1786, from North America. He cites Plukenet's figures and description published in 1769 who described it as "*Helleborine Calceolus Mariae* dicta *Caroliniensis*, bifolia." Catesby in his Natural History of North Carolina in 1748 figured it in colors and says of it: "This plant produces the most elegant flower of all the Helleborine tribe, and is in great esteem with the North American Indians for decking their hair, etc. They call it the Moccasin Flower, which also signifies in their language, a shoe or slipper."

It was formerly found in the wilder portions of Greater New York, on Staten Island and in Van Courtland Park, but is becoming extinct, on account of its showy flowers, which are

usually picked close to the root, as in the accompanying illustration.

ELIZABETH G. BRITTON.

CACTUS STUDIES IN THE WEST INDIES

TO THE SCIENTIFIC DIRECTORS.

Gentlemen: Pursuant to permission given by you, I was absent from the Garden for the period between January 25 and April 17, 1913, engaged in further studies of the West Indian flora, with special reference to the cacti, in continuation of our coöperation in the cactus researches of the Carnegie Institution of Washington. It has become necessary, in the progress of these investigations, that a more complete and accurate knowledge of the West Indian cacti be obtained, and my own studies of the general flora of the West Indies required further field work.

The expedition was organized jointly with Dr. J. N. Rose, research associate of the Carnegie Institution, and after consultation with Dr. D. T. MacDougal, its director of botanical research. Dr. J. A. Shafer accompanied me as a field assistant; Mrs. Britton and Miss Delia W. Marble were also in the party and rendered valuable assistance in collecting, preserving and recording specimens; Dr. Rose was aided by Mr. William R. Fitch, and also by Mr. Paul G. Russell, of the staff of the United States National Museum.

Our first stop was at St. Thomas, of the Danish Islands, which we reached on the steamer "Guiana" on January 31. Dr. Rose and his assistants proceeded south on the "Guiana" to the British Island Antigua, where important collections were made by them, the plants of Antigua being but poorly represented in American museums; they also made studies and collections on St. Kitts and St. Croix, rejoining our party on St. Thomas on February 25, bringing with them living specimens of all the cacti found, together with other kinds of living plants, and many museum and herbarium specimens.

We made St. Thomas a base for the botanical exploration of

the Virgin Islands; the ladies stayed at the attractive town, Charlotte Amalia. I chartered the sloop "West Indian" and cruised with Dr. Shafer to windward as far as Tortola; we spent five days on St. Jan and visited several of the smaller islands of this beautiful archipelago, still almost unknown to tourists. The charming views of islands and sea had from the higher elevations—about 1,500 feet on St. Thomas, somewhat less on St. Jan, and about 1,800 feet on Tortola—are well worth all the time required to reach them and the winter climate at sea-level is perfection; for those fond of sailing or fishing, time can be spent delightfully; there are a number of sloops available, and as all the trade among the Virgin Islands is by sail, expert boatmen are readily secured.

One of our objects was the study and collection of the interesting little round cactus known to botanists as *Mamillaria nivosa*, which inhabits certain headlands and cliffs in these islands. We were guided to one of the localities known for it, Little St. James Island, by the Rev. A. B. Romig, of the Moravian mission at Nisky, St. Thomas, who has much interest in botany; we are indebted to him for valuable aid and advice and for delightful association. We subsequently found the *Mamillaria nivosa* on other islands, and shipped many to the Garden for public exhibition and scientific study.

Reaching Tortola February 13, we passed from Danish to British jurisdiction, separated by only a narrow waterway. We were cordially received by Mr. W. C. Fishlock, agricultural instructor for the Virgin Islands in charge of the Botanical Station at Roadtown. Five days were given to exploration and collecting on Tortola and on smaller islands nearby, including a visit to the small area of primaeval forest remaining on that island at "High Bush," where many rare and characteristic species of the native flora are still preserved; I was much pleased to learn that steps may be taken toward the permanent preservation of this high altitude flora and the possible reforestation of denuded areas adjacent; on St. Thomas there is scarcely any virgin forest remaining, and but little on St. Jan; reforestation work on all these islands would be of great advantage to their inhabitants.

Leaving Dr. Shafer to make supplementary collections on Tortola, Mr. Fishlock and I started on February 18 on the mail schooner "Lady Constance" for a five days' cruise farther to windward, the "West Indian" standing by; of how the Danish sloop scandalously outsailed the mail boat, leaving us to transfer to the foreign sloop off Virgin Gorda at three o'clock the next morning this is no place to narrate, but it will doubtless go down in the unwritten history of Virgin Island sailors. Our goal, the botanically little-known island Anagada, farthest of all the Virgins to windward, was thus reached before midday on February 19.

Anagada, physiographically and geologically, is totally different from all other islands of the archipelago; it is an essentially level coral-limestone and limestone sand cay, at no point over 30 feet in altitude above the ocean. Its native flora contains many species not known to occur on the other Virgin Islands, and, as a whole, it is strikingly Bahamian in relationship, paralleling its geological structure. We spent two most interesting days here and collected specimens of 123 species, but we examined only small areas. A complete botanical survey made by means of visits of ten days' or two weeks' duration at intervals of three months would reveal most of the species, and would be a notable contribution to geographic botany; the flora is highly specialized, and very few specimens from Anagada are preserved in any museum or herbarium. Two kinds of palms exist wild, whose botanical affinities are as yet unknown, inasmuch as neither flowers nor fruit of them have been scientifically observed; we took specimens of their leaves and brought away young plants for growing at the Roadtown Botanical Station. One is a palmetto (*Sabal*), the other a thatch-palm (probably *Thrinax*).

The "West Indian" raced across the Anagada Channel under the full moon of February 20, and the next day was given to study and collection on Virgin Gorda, an island also botanically little known. Our time being limited, most of it was taken up at lower elevations in the vicinity of the Valley Settlement, among the great masses of granitic rocks which here form a striking and unusual physiographic feature; cleavage and erosion

have left these rocks in rectangular pieces as large as houses, so that from the sea, the impression of approaching a ruined city is easily obtained and a nearby cay of the same structure bears the name "Broken Jerusalem," said to have been given by buccaneers. The flora proved interesting, and we found specimens to collect all the day, and wished that we might at some future time explore the forest at the higher altitudes, previously visited by Mr. Fishlock. A critical botanical survey of this island is also very desirable.

Returning to Roadtown, Tortola, in the evening of February 21, we found that Dr. Shafer had succeeded in making interesting collections, aided by Mr. B. R. Fouseca. The next day was given to the care and packing of plants and specimens and to observations at the Botanical Station. A pleasant and instructive interview with Commissioner Jarvis concluded our delightful exploration of the British Virgin Islands, and on February 23 we set sail for the west, touching at the east end of St. Jan, and also at Lamosure, on the south side of that island, to call on Mr. A. White, owner of the "West Indian," to whom we are indebted for coöperation and hospitality. We reached Charlotte Amalia, St. Thomas, the next morning. During our absence, the ladies had made collections at the higher altitudes and on the north side of St. Thomas, using donkeys for transportation, and the combined accumulation of living plants and of prepared specimens was extensive; this was much further augmented the next day by the arrival of Dr. Rose and his assistants from St. Croix, when the members of the expedition were again united.

Several days were now required for care, study and packing; short trips were made, for special purposes, and nineteen boxes were delivered to the steamship company for shipment to the Garden.

Dr. Rose and I concluded, after consultation, that the cactus investigations would be most effectively prosecuted by a second subdivision of the party; I therefore proceeded on March 1 with Dr. Shafer on the "West Indian" to Fajardo, Porto Rico. The others came to San Juan on the steamship "Präsident" on March 5, Dr. Rose and his assistants continuing on the same vessel to

Santo Domingo, while Mrs. Britton and Miss Marble went across Porto Rico on the motor-bus to Coamo Springs.

The flora of Porto Rico is, in general, better known than that of the Virgin Islands, and, with the exception of that of St. Thomas, much better represented in museums and herbaria. Previous to the annexation of the island by the United States, it had been studied by Spanish and by German botanists, and its botanical literature is considerable, culminated by the publication, between the years 1903 and 1911, of the valuable "Flora Portoricensis" written by Professor Urban of the Berlin Botanical Garden, a critical list of the flowering plants and ferns only, but without descriptions of the plants, and thus not applicable to general use. Soon after the American occupation, visits were made by botanists from the New York Botanical Garden, the Field Museum of Natural History, Yale University, and the United States Department of Agriculture, and collections made between 1899 and 1906, which added much to the earlier Spanish and German work. More recently resident American botanists have supplemented these collections and it has become apparent that Professor Urban's list is not a complete catalogue, while there is no comprehensive publication dealing with the lower cryptogams except Professor A. W. Evans' studies of the liverworts. The recent establishment of the College of Agriculture by the University of Porto Rico, and the diffusion of knowledge by it and by the schools, make the preparation of a descriptive flora of Porto Rico an educational necessity, and further field work highly desirable; the same considerations apply to the zoology and to the geology of the colony and a complete physical and natural history survey would be of great value, not alone to Porto Ricans but as an important contribution to scientific knowledge.

Dr. Shafer and I gave five days to studies and collections in the vicinity of Fajardo, reaching the mountain forest above Rio Arriba, where, among many trees of interest, we found the spiny *coyure* palm (*Bactris*) bearing clusters of its beautiful bright red fruits, a quantity of which was secured for germination at home and at the Agricultural Experiment Station at Mayaguez;

another palm of eastern Porto Rico was found on the wooded hills near Ceiba, but with leaves only; this is a silver thatch (*Coccothrinax*), previously studied here by Sintenis, who also failed to obtain either flowers or fruit, so the actual botanical affinity of the species still remains to be determined. The night-blooming climbing cactus of Porto Rico and the Virgin Islands (*Hylocereus trigonus*) is very plentiful on coastal bluffs at the Fajardo *playa*.

Coming south and west on the coastwise steamer "Ramos" we reached Ponce on the morning of March 8, a beautiful and interesting trip, the ship touching at several ports; we were joined again by the ladies on March 9. The dry cactus region from Ponce to Guanica was studied for a week; specimens of all the species were shipped to the Garden, and large collections of the general flora were made at Ponce, Penuelas, Tallaboa, Guayanilla, and at Guanica and vicinity, where we were efficiently aided by Dr. Morse and Mr. Rubinstein, of the staff of the great sugar-mill, and found many species of interest, including several additions to the flora of Porto Rico.

One day (March 14) was devoted to studies of the mountain forest at Alto de la Bandera, on the new *carretera* from Adjuntas to Jayuya, at an altitude of about 2,000 feet, which we reached by motor car from Ponce; this proved the banner-day of the trip, for in this enchanting forest, made up of many kinds of trees with the noble "palma de Sierra" (*Acrista monticola*) dominant, we collected specimens of not fewer than 213 species, a result submitted as a record-breaker in botanical field work. Orchids festooned and clothed the tree trunks; ferns in great variety and luxuriance were everywhere, from small filmys up to tall arborescent species; mosses and liverworts carpeted the banks and logs, lichens were abundant and fungi numerous, while the kinds of flowering shrubs and climbers were unexpectedly large; that we came out to the car saturated by a mountain shower, and dried up in the subsequent sunshine were only incidents of this joyous experience, and we came into Ponce at dinner time with both the inside and the outside of the motor, full of packages of spoils. For a view of the high altitude flora, we commend

subsequent collectors to the slopes and valleys of Alto de la Bandera.

Leaving Ponce March 16, a further subdivision of the party was made; Dr. Shafer went across Porto Rico to San Juan to arrange for a Curacao trip, while the ladies accompanied me to Coamo Springs; after passing Juana Diaz we espied a range of rough limestone hills several miles to the north of the road, which were capped by a slender palm, observation of which through field-glasses indicated that it was of special interest; Mrs. Britton subsequently climbed up to it and obtained its ripe fruit, which shows it to be a species hitherto botanically unknown, and one of the most interesting plants obtained during the entire trip. Farther on toward Coamo, we restudied the type tree of the beautiful purple-flowered "*palo de tortuga*" (*Phlebotaenia Cowellii*) found by us here in 1906, and one of the most elegant of all trees when in bloom.

Sailing from San Juan, March 18, on the steamship "Philadelphia," Dr. Shafer and I reached the Dutch Island Curacao in the early morning of March 20. For one fond of the ocean, this voyage is delightful, but the trade-winds are strong and the seas high, the southern course of the ship bringing the trade-wind nearly abeam. The force exerted by the trade-wind on the waters of the Caribbean Sea, constantly pushing the ocean's surface westward and supplying the energy for the flow of the Gulf Stream, was very impressive and the experience was one I had long desired; the Gulf Stream is an old friend from the Straits of Florida to the North Atlantic, and to view its origin in the waves of the Caribbean was most interesting.

Almost as soon as the "Philadelphia" was tied up at the quaint, clean and substantial city of Willemstad, the active venerable United States Consul, Mr. Cheney, came aboard, and we were introduced by him to Mr. Northcote, our Minister to Venezuela, who was proceeding to Caracas. Mr. Cheney's advice, and his introductions to prominent Curassavians made our seven days' stay profitable and delightful. We visited many parts of the island and were most hospitably received and cordially assisted. The many miles of roads are in excellent

condition and motor cars took us rapidly from one point of interest to another, enabling us to study many different hills, valleys, cliffs and plains. Cacti exist here in almost countless numbers of individuals, but in less than a dozen species. The larger are great much-branched columnar kinds (relatives of *Cereus*), reaching 30 feet in height and formidably armed all over, bearing edible fruits, and extensively planted for hedges and fences, which are essentially impenetrable. The smallest is a few-jointed little prickly pear inhabiting the surface of rough limestone rocks (*Opuntia curassavica*), definitely known only from here, but it has relatives in Porto Rico and in the Virgin Islands. The rarest, and the plant which we most wanted to find, is the one described by Linnaeus under the name *Cactus mamillaris*, which has been lost to science for very many years; it is a small, nearly globular species, the type of Haworth's genus *Mamillaria*, of which over 100 species have been described mostly from Mexico and the southwestern United States; to recent botanists it has been unknown except from old descriptions, and illustrations, and where it came from has been uncertain, but after reading pre-Linnaean authors I was convinced that Curacao was its home, and so it proved, for on March 23, in the late afternoon, on scaling a steep craggy limestone hill, we found the plant growing in large numbers in and among the rocks at the level summit. Our excitement and our satisfaction were great, for at last we knew the type species of *Mamillaria*, and it bore both its little cream-colored flowers and its bright red little pear-shaped fruits at the same time, to welcome us.

By rapidly moving to different parts of the island we were able to obtain a general knowledge of its botanical features and to collect herbarium specimens of about 250 species, and two large boxes of living plants, including a representation of all the cacti found; these I considered of sufficient importance to send Dr. Shafer immediately to New York with, and he therefore proceeded north on the "Philadelphia," sailing March 27. I accompanied him to San Juan and spent the afternoon of March 29 at the Experimental Station of the Sugar-growers Association at

Rio Piedras upon the invitation of Mr. J. R. Johnston, pathologist of the station, a valued correspondent of the Garden, who has made collections of Porto Rican plants for us and will continue his botanical studies. Mr. Crawley, director of this important institution, also assured me of his interest in our work. I met Mrs. Britton and Miss Marble at Mayagüez on March 30; they had made additional collections about Coamo Springs.

The establishment of a modern well-equipped Agricultural College at Mayagüez, under the able direction of Professor F. L. Stevens, adjoining the Agricultural Experiment Station, has made this city the insular center of information about plants. We remained there until April 10, making collections in western Porto Rico, accompanied most of the time by Mr. W. E. Hess, plant propagator of the Experiment Station, kindly detailed for this service by the director, Mr. May, and part of the time by Professor Stevens, who is making a special study of the parasitic fungi. Our trips included a visit to the coast at Joyada, where we saw the great groves of the hat palm, "palma de sombrero" (*Inodes causiarum*) and the hand-weaving of the Porto Rican hats.

A two days' excursion to the mountains at Maricao and the Monte Alegrillo proved fertile in results botanically, for 281 species were collected besides the many fungi taken by Professor Stevens, and here we had another fine experience in the primaeval forest dominated by *Acrista monticola*. A number of plants endemic in Porto Rico grow only in this interesting region. Professor Stevens and I agreed that this was the best site for a mountain biological station and then events moved rapidly, for at a meeting of the Trustees of the University which he attended a few days later, he was awarded a preliminary appropriation for such a station, and at a fortunate interview with Mr. Wilson, Commissioner of the Interior at Mayagüez, he was promised the necessary land; this is surely unparalleled rapidity in the establishment of a scientific station, which cannot fail to add greatly to botanical, horticultural and agricultural knowledge in Porto Rico; that our northern institutions will cordially coöperate with Professor Stevens in its use and development goes

without saying. We also reached the mountains at Lares, and between that town and San Sebastian visited the home of the rarest and most beautiful of all Porto Rican palms, described by Mr. O. F. Cook some years ago from foliage alone, under the name *Cocops rivalis*. We were very fortunate in finding one large tree bearing clusters of immature fruit, and from this the relationship of this palm may now be determined. The Mesa mountain at Mayagüez yielded specimens of several plants unrecorded as growing in Porto Rico.

Returning to San Juan April 10, we were able to visit the fruit region between Bayamon and Vega Baja on the 11th and to make a considerable collection on wooded limestone hills at Candelaria, completing the field work of the New York part of the expedition, which secured and brought to the Garden 3,152 separate collections of plants, including over 9,000 specimens. We sailed on the "Caracas" from San Juan on April 12.

With additional field work and through the coöperation of Professor Stevens, Mr. Johnston, and other insular botanists, it will be possible to prepare a descriptive flora of Porto Rico for publication within a few years. The botany of the small islands Mona and Desecheo, west of Porto Rico and of Cayo de Muertos off Ponce, is unknown, except for fine specimens of *Mamillaria nivosa* and *Phyllanthus Epiphyllanthus* brought to me from Mona by Messrs. E. D. Noble and Marc Lejeune; no recent collections have been made on Vieques, but a few specimens from that island are preserved in European museums. In the mountain forests and coastal thickets, trees and shrubs doubtless exist which have not yet been identified botanically, while the lichens and fungi have scarcely yet been studied nor collected. The marine algae are incompletely known, and the fresh-water algae not at all. The botany of Porto Rico thus offers an inviting field for further investigation.

Dr. Rose and his assistants made a successful visit to Santo Domingo and secured large collections on the southern and eastern sides of that island, making collections at Macoris, Azua, and Sanchez. The region about Azua is extremely dry, the annual rainfall in recent years being only about 8 inches; the

town is in the middle of a great cactus desert consisting of more than a dozen little-known species.

Respectfully submitted,
N. L. BRITTON,
Director-in-Chief.

JOHN INNES KANE

Mr. John Innes Kane, a member of the Board of Managers of the New York Botanical Garden since 1896, died at his home in New York City on February 1, 1913.

Mr. Kane served the Garden continuously as Chairman of the Membership Committee of the Board of Managers, and until recently was a member of the Executive Committee. He was much interested in botanical science, and prior to the establishment of the Garden, he had taken much pleasure in botanical studies at Columbia College. During the period of planning and throughout the earlier construction work of the institution, he attended nearly all the meetings of the Board and of the committees of which he was a member, and made frequent visits to the grounds in Bronx Park. More recently, his health prevented active participation, but his interest was always maintained. He contributed liberally to special funds needed for scientific and educational work, and qualified as a Fellow for Life.

Resolved: That the Board of Managers of the New York Botanical Garden deeply deplore their loss in the death of their esteemed associate, John Innes Kane.

Resolved: That this preamble and resolutions be spread upon the minutes of the Board, and that a copy be sent to his bereaved family.

Memorial and resolutions adopted by the Board of Managers April 24, 1913.

N. L. BRITTON,
Secretary.

INSURANCE OF GREENHOUSES

It will be of general interest to know that the glass of the large Conservatory Ranges Nos. 1 and 2 in the New York Botanical Garden has recently been insured against all direct loss or damage by wind-storms, cyclones, or tornadoes, covering also breakage by hail, at its full value, including cost of resetting. The rate is 1¼ per cent. for a period of three years, and the policy is issued by the Globe & Rutgers Fire Insurance Company.

N. L. BRITTON,
Director-in-Chief.

CONFERENCE NOTES

The April Conference of the Scientific Staff and Registered Students of the New York Botanical Garden was held April 7. The topics for this conference were presented by Dr. P. A. Rydberg and Dr. F. A. Seaver.

Dr. Rydberg had thought it advisable to put in record some of his observations during several trips to the Rocky Mountains under the head of "Phytogeographical Notes on the Rocky Mountain Region." He presented before the conference the first part of his discussion of the alpine region of the Rockies.

The alpine region roughly speaking is the region between the perpetual snow and the timber-line. A perpetual snow-line cannot be spoken of in the southern Rockies; even the highest peaks do not have a perpetual snow cap, like for instance Mt. Shasta or Mt. Hood. It is probably due to the amount of moisture and precipitation. Snow, if present, is in the form of snow-drifts or small glaciers. The amount of snow does not always depend upon the height of the mountain. The Snowy Range of Colorado has more snow than the much higher Gray's Peak, Sierra Blanca, or Mt. Massive. In the Canadian Rockies and the Selkirks the conditions are different and more like the Alps. The peaks have perpetual snow caps and glaciers extend far into the valleys. In northern Montana is found the only glacier regions of the Rockies.

The lower limit of the alpine region is the timber-line, which

is really no well defined boundary line, but the transition zone between the two regions. Different authors have fixed the timber-line differently.

1. The Forest Line, that is where the continuous forest stops.
2. The Grove Line, where the tree ceases to form communities of larger or smaller sizes.
3. Tree Line, where the arboreal species cease to form trees.
4. Absolute Timber-line, that is where these species disappear altogether even as "krumholz."

It is superfluous to consider more than two of these lines, the forest line and the absolute timber-line. The region between these two is a transition zone, or better, a zone of strife. A continuous warfare goes on between the forest and the alpine grassland.

Then he treated the factors that are governing the timber-line. The conditions that have been given as causing or modifying the timber-line are:

1. The decreased temperature during the growing season. In the Rockies there are no records of the lowest temperature that the trees can stand, but in general the arborescent flora disappears where the mean temperature during the warmest month of the year does not reach 5° C.

2. Short growing season. In the arctic region this factor acts parallel to the preceding, but not so in the alpine region. In the heads of the valleys where the snow drifts are formed during the winter and melt late in the summer and along glaciers and permanent snow, the frost is kept longer in the ground and the growing season is naturally shortened. Therefore, the timber-line is much lower in the valley heads than on the slopes.

3. Late frost on account of lack of protection from the snow. Late frost often kills large tracts of conifers which seldom produce a second crop of shoots in the same season.

4. Strong desiccating winds. This feature is much more important than usually estimated. The trees of the timber-line and especially those few isolated stragglers above the real forest-line show great effect from the wind. The trees are not only low, stunted, ragged, with enormously elongated branches spreading

on the ground, but conspicuously one-sided, telling at a glance the direction of the wind. On the wind-swept sides of the mountains the timber does not reach by far as high and in many places there is no timber at all. In the Abajo Mountains of southwestern Utah, for instance, there is no timber above the semi-arid cedar-piñon belt of the foot-hills.

5. Deep snow. As the desiccating winds lower the altitude on the wind-swept regions, so does the snow in the heads of the valleys, not only by shortening the growing season, but also by smothering the tree vegetation. Herbs and low shrubs can stand to be covered over by snow much better than trees, for their growing season does not begin before the snow is practically off the ground. While the tops of the trees may be above the snow and exposed to the summer heat much before the snow-covered roots and lower branches have been melted, the lower portion of the tree is cut off from the air while the upper portion is already in vital activity. It is easier to distinguish trees stunted by the action of wind than those stunted by the smothering snow. In the former the lower branches are enormously developed compared with the upper, while in the latter the lower branches are dead or covered by fungi or their mycelium. The usual condition in the Rockies is that wherever there is a large valley head where the snow has chance to lodge, this is always devoid of trees, except in places of higher ground where the snow drifts have not been so deep.

6. Form of precipitation. In high altitudes it is too rare to hold much moisture and the rain falls at the least lowering of the temperature. The rain falls, therefore, in the form of mists or in light and fine showers which only wet the surface. Nowhere in the Rockies is the moisture very great. In the foot-hill region and on the surrounding plains, the temperature in the summer is too high to allow any precipitation. These zones are also arid. It is at middle elevation that the precipitation is the greatest. The air here is dense enough to hold more moisture and the temperature low enough to allow precipitation.

7. Large mountain masses. In the Swiss Alps observations have also been made that in regions of large mountain masses

the timber-line is higher up than on isolated mountains. This observation seems to hold good in the Rockies. In the isolated Belt Mountains and Crazy Mountains of Montana, the timber-line is lower than in the main Rockies. In the Wasatch and La Salle Mountains of Utah, the timber-line is lower than in the Rockies of Colorado. Even in the Rockies, the timber-line is higher where the mountains are more massed. For instance at Mt. Massive it is higher than on Pikes Peak, Sierra Blanca, or Long's Peak. No adequate explanation has been made and Dr. Rydberg had no suggestions to make.

8. Exposure to or protection from direct sunlight has evidently, also, great influence upon the altitude of the timber-line.

9. Physiographical Barriers. To these may be counted snow-drifts and the glaciers already mentioned. Besides these are the precipitious cliffs and rock-slides. Meeting one of these barriers the timber ceases to grow sometimes a thousand feet lower than the physiological timber-line. Alpine plants are often found in the crevices of the cliffs and among the rocks in such places.

10. Oecological Barriers. Sometimes an oecological timber-line is mentioned, *i. e.*, where the bacteria in the soil and other organisms necessary for the growth of trees cease to exist. Theoretically it is easy to see that such a timber-line may exist, but practically there is no information regarding its existence in the Rocky Mountains distinct from the merely physiological ones.

11. Economic timber-line. In Switzerland there exists an economic timber-line. The alpine meadows are used for summer pastures for sheep and goats. These animals make depredations on the new trees and hinder the spreading of the forest, but in many places the subalpine forests are actually cut down by man to make room for more pastures. Such economic timber-line cannot be spoken of in the Rockies.

After having discussed the causes of the timber-line, it is easier to define what an alpine plant is. In short, it is a plant that can endure the climate of the mountains above the timber line. It is, therefore, a plant that requires less temperature

during the growing season than the forest trees or can stand a shorter growing season, or is less affected by frost, and besides can stand better desiccating winds, deep snow, less precipitation, etc., or a combiation of such conditions. Some authors claim that alpine and arctic plants are xerophytes, but this is not necessarily so. Not a few arctic and alpine plants require a good deal of moisture, growing only below snow banks or in springy or boggy places. Even a few aquatic plants are found.

Then Dr. Rydberg shortly discussed the formation of the alpine flora and gave the following formations: The Rock-slide Formation, Mountain Crest Formation, Mountain Seep Formation, Alpine Meadow Formation, Alpine Bog Formation, and Alpine Lake and Pond Formation. To these may be also added two rather local formations, the cliff formation and the snow-drift formation.

Dr. F. J. Seaver showed specimens of the hickory barkbeetle and reviewed briefly the life history and habits of the insect. Attention was called to some of the natural enemies of this injurious insect and also artificial means of controlling it. An illustrated account of this pest will appear in a later number of the JOURNAL.

A. B. STOUT.

NOTES, NEWS AND COMMENT

Mr. E. G. Arzberger was granted a scholarship for the month of May to make an anatomical study of *Coleus* with respect to the distribution of the colored tissues.

Mr. A. C. Fraser, of Cornell University, has come to the New York Botanical Garden to assist during the coming summer in the experimental work in plant breeding.

Mr. William H. Lamb, of the United States Forest Service, recently spent a few days at the Garden consulting arborescent specimens in connection with his work in Forest Distribution.

Dr. William Trelease, recently director of the Missouri Botanical Garden, has been appointed professor of botany in the University of Illinois at Urbana. He succeeds Dr. T. J. Burrill, retired, who as professor, dean, and vice-president has been connected with the institution since 1868.

Mr. G. Claridge Druce, M.A., F.L.S., ex-mayor of Oxford, curator of the Fielding Herbarium of the University of Oxford, author of "List of British Plants," "Flora of Berkshire," and many other works relating to the British flora, was a visitor at the Garden on April 24.

Mr. Walter T. Swingle, of the Bureau of Plant Industry, recently spent several days at the Garden, studying specimens of *Citrus* in the herbarium.

Dr. Charles Thom, of the United States Department of Agriculture, recently spent several days at the Garden consulting various publications in the library.

Professors Mel T. Cook and M. A. Blake, with several members of the senior class of Rutgers College, spent May 2 at the Garden, visiting the conservatories and the experimental garden.

During the spring, numerous cases of variation have appeared in the beds of tulips grown at the Garden. These variations are of three kinds: changes in color, changes in shape, and changes in the character of the floral parts. In a bed of 250 flowering bulbs of the variety "Yellow Prince" one flower had in one of the parts of the perianth a segment of dark red. This was the only variation found in the yellow-flowered varieties. In the beds of "Crimson King" and "Prince of Austria," thirty flowers showed more or less of yellow in streaks. In some cases only a few small streaks were present. In other cases the flower could be described as yellow with a few red streaks. Many of these

striped flowers also showed variations in shape, the extreme cases having narrow floral parts not more than one fourth the width of the petals on typical flowers of the variety. Three flowers were noted in which the parts of the perianth were more or less green and leaf-like. On these flowers some of the parts of the perianth were entirely green, others were of the usual color, and others were sectorially differentiated, the whole flower being nearly half green and half red in color. It was noted in several instances that a tulip showing variation grew very close to one that was normal for the variety, a condition which indicated that the two were sister plants.

In another bed of tulips, of the variety known as the Cottage Tulip, nearly fifty cases of fasciation were observed as well as a few cases of variation similar to those described above.

In view of the particular interest which bud-variations and fasciations have to botany and to horticulture, these plants will be isolated and grown in the experimental garden for further study.—A. B. S.

The cottage and Darwin tulips are in full bloom, days ahead of their normal flowering period which comes toward the end of May. They have already (May 16) been in bloom for a week or ten days. Some of these are especially fine. One of the cottage tulips, known as Orange Beauty, is particularly striking. It is a long flower, a vivid orange-red. Another cottage tulip is La Merveille, unusual in its long pointed flower, the color a rosy carmine. This is of unusual merit. Among the Darwin tulips Clara Butt is as usual in the front rank, with Baronne de la Tonnaye, very similar, of equal worth. Those who like a very dark flower will find in the Darwin tulip, The Sultan, all they can desire. It is of the deepest black-purple. The parrot tulips have been unusually fine this year, the flowers large, and a greater number than usual of the bulbs bearing flowers.

The irises or flags are now taking a prominent place in the herbaceous border. One of the first to appear is the little *Iris cristata* with its sky-blue flowers. *Iris florentina*, almost white with a faint flush of lavender and delightfully scented, follows.

The German iris, *I. germanica*, occurs in great masses of rich dark color in many parts of the decorative beds. Many of the forms, other than the purple, offered by nurseries as varieties of the German iris are referable to *I. sambucina* and *I. squalens*. *Iris pumila* is also an early flower, occurring in violet and yellow. It is quite dwarf. *Iris Statelliae*, of a pale straw color, comes at about the same time as *I. pumila*. *I. pallida* is just coming into flower, the variety of this known as *Dalmatica* being especially desirable. By selection of species a continuous display of irises may be had from late April or early May to late June or July, when the Japanese iris, *I. laevigata*, commonly known as *I. Kaempferi*, sends forth its gorgeous display.—G. V. N.

Meteorology for April.—The total precipitation for the month was 5.18 inches. Maximum temperatures for each week were as follows: 63° on the 6th, 60° on the 12th, 72° on the 19th, and *83° on the 25th.* The minimum temperatures were 32° on the 7th, *27° on the 10th*, 31° on the 21st, and 40° on the 22d.

ACCESSIONS

MUSEUMS AND HERBARIUM

15 specimens of hybrid willows from Massachusetts. (Given by Mr. F. F. Forbes.)

119 specimens of fungi from Porto Rico. (By exchange with Mr. John R. Johnston.)

3 specimens of polypores from Montana. (By exchange with Professor James R. Weir.)

12 specimens of fungi from Germany. (By exchange with Dr. H. D. House.)

20 specimens "American Hepaticae" numbers 101–120. (Given by Miss Caroline C. Haynes.)

117 specimens of flowering plants from Indiana. (By exchange with Mr. C. C. Deam.)

10 specimens of fungi from Porto Rico. (By exchange with Professor E. W. D. Holway.)

1 specimen of *Puccinia Xanthii* from California. (By exchange with Professor J. C. Arthur.)

50 specimens "Mycotheca Boreali-Africana" fascicles 2 and 3. (Distributed by René Maire.)

200 specimens "Fungi Columbian" fascicles 38 and 39. (Distributed by Mr. Elam Bartholomew.)

30 specimens "Fungi Dakotenses" fascicle 8. (Distributed by Dr. J. F. Brenckle.)

72 specimens of rusts from New York and Massachusetts. (Collected by Mr. F. D. Fromme.)

4 specimens of fungi from Wisconsin. (By exchange with Dr. J. J. Davis.)

200 specimens "North American Uredinales" centuries 6 and 7. (Distributed by ——.)

25 specimens "Lichenes Suecici Exsiccati," fascicles 11 and 12. (Distributed by Dr. G. O. A. Malme.)

5 specimens of *Baptisia* from Louisiana. (Given by Professor R. C. Cocks.)

1 specimen of moss from the East Indies. (By exchange with Brother Leon.)

2,750 specimens of mosses, being the herbarium of Professor O. D. Allen.

1 specimen of fern from Mexico. (By exchange with the herbarium of Prince Roland Bonaparte.)

3 specimens of *Taxus* and *Pteris* from Florida. (Given by Dr. N. F. Petersen.)

Members of the Corporation

Fritz Achelis
Edward D. Adams
Charles B. Alexander
John D. Archbold
George F. Baker
Eugene P. Bicknell
George S. Bowdoin
Prof. N. L. Britton
Prof. Edw. S. Burgess
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Prof. C. F. Chandler
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JOURNAL

OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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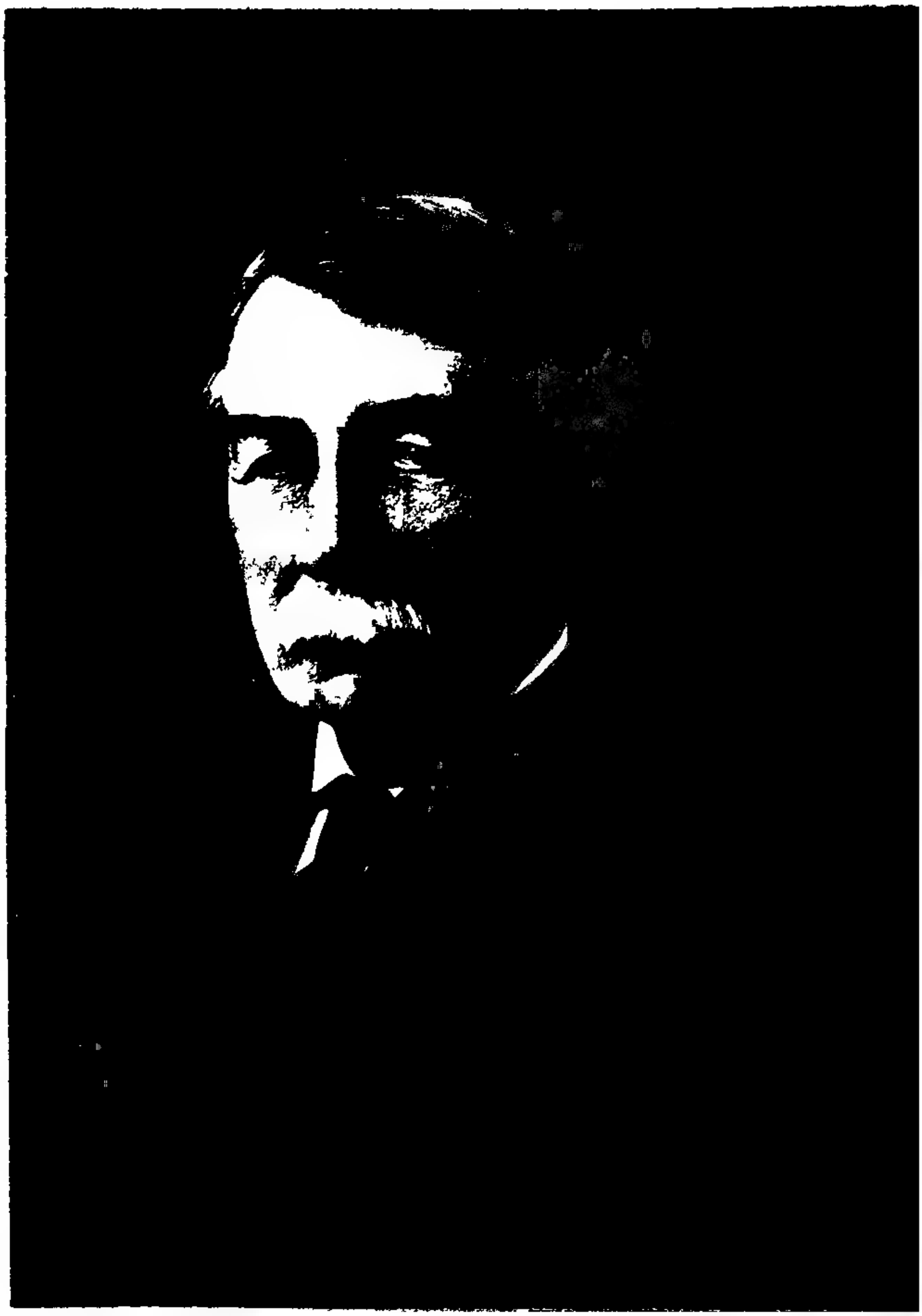


JOURNAL

OF

The New York Botanical Garden

VOL. XIV June, 1913 No. 162

ADDISON BROWN

By the death of Ex-Judge Addison Brown, on April 9, 1913, the New York Botanical Garden has lost a member of its Board of Managers, who, more than any other person, made the establishment of the institution possible.

Judge Brown was born at West Newbury, Massachusetts, February 21, 1830, and graduated from Amherst College in 1849 and from Harvard in 1852. He became a member of the New York Bar in 1855 and practiced law for many years. In 1881, he was appointed United States District Judge for the Southern District of New York and held this position for twenty years, during which period he handed down a great number of opinions, largely in shipping admiralty and bankruptcy; a digest of his decisions was published in 1902, and he was awarded the degree of LL.D. by Harvard College in the same year.

He joined the Torrey Botanical Club of New York in 1875, two years after the organization of that society, and for many years was active in its work, often participating in its Saturday field meetings, and he contributed much to the interest of its ordinary sessions. During these years, he was a diligent and enthusiastic collector of botanical specimens and accumulated thus, as well as by exchange with other botanists, a large and valuable herbarium; he made botanical trips to distant parts of the United States, visiting the Rocky Mountains and the Southern Alleghanies, and also collected plants in Europe; his botanical library is comprehensive. In 1893, he was elected president of the Torrey Botanical Club and was unanimously

[JOURNAL for May, 1913 (14: 97-118), was issued June 3, 1913.]

re-elected until 1905, when he declined to serve longer in this position.

The publications of the Torrey Botanical Club contain many notes and observations contributed by him from time to time. About the time of his election to the presidency of this Club, he proposed to Dr. N. L. Britton the preparation of an illustrated flora of the northern United States and Canada, took up the preparation of drawings and manuscript with great interest and enthusiasm, and the work was published in three volumes in 1896, 1897 and 1898. The edition of this book was exhausted in 1909, and the preparation of a second edition was undertaken, which was completed a few days before his death. A comprehensive paper entitled "The Elgin Botanical Garden and Its Relation to Columbia College and the New Hampshire Grants" was published in 1908.

The movement for a great botanical garden in New York City was initiated by the appointment of a Botanical Garden Committee by the Torrey Botanical Club in November, 1888. Judge Brown was a member of that committee and participated in conferences with the Commissioners of Public Parks relative to land for the institution and, together with Chief Justice Charles P. Daly, framed the original charter of the New York Botanical Garden granted by the State Legislature in 1891, as well as the amended charter of 1894. He made the initial subscription of twenty-five thousand dollars to the fund of two hundred and fifty thousand dollars required by the Commissioners of Parks before appropriating the land in Bronx Park in 1895. As a member of the Board of Managers since its organization, he served first as Chairman of its Committee on Plans, then as Chairman of the Executive Committee, and was elected President in 1910, holding that office until his death. During the whole history of the Garden, he has been zealous in promoting its welfare and development and his advice and counsel have been most valuable.

The illustration of plants was his greatest interest, and several years ago he proposed the establishment of a periodical publication devoted to such illustration in color, hoping to accomplish

AMERICAN OR MOUNTAIN LAUREL

this during his lifetime. Failing health and his work on the second edition of the "Illustrated Flora" prevented the realization of his desire, but provision is made in his will for the establishment of such a magazine by the New York Botanical Garden.

Resolved: That the Managers of the New York Botanical Garden deeply deplore their loss by the death of President Addison Brown, who for nearly forty years has been indefatigable in promoting public interest in botany and its allied sciences.

Resolved: That the preceding memorial be spread upon the minutes of the Board, and a copy transmitted to his bereaved family.

Memorial and resolutions adopted by the Board of Managers April 24, 1913.

N. L. BRITTON,
Secretary.

WILD PLANTS NEEDING PROTECTION*

8. "AMERICAN OR MOUNTAIN LAUREL" (*Kalmia latifolia* L.)

WITH PLATE CXVII

In the beginning of June, when the days are long and warm and the daisies and clover in the tall grass are waving in the breeze, when the tulip-trees are in bloom and the roses and paeonies fill the gardens with their perfume and color, then the flowers of the laurel may be found, rivalling in their delicacy of color and perfect symmetry of form any of the more showy blossoms of cultivation. It seems as if the climax of all that is dainty and lovely had been reached in this beautiful American wild flower.

But where the laurel once was abundant it is rapidly becoming scarce or extinct. On account of its evergreen leaves, it is gathered in winter for Christmas decorations and other festivities; all the year round it is used to decorate fruit-stands and its wood

* Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

is eagerly sought for rustic furniture, for tools and as a substitute for making brier-wood pipes. It once grew abundantly on the banks of the Harlem River at High Bridge and Inwood; there is still a little of it left in Bronx Park, but it seldom blooms, which probably accounts for there being any of it still indigenous. The flowers grow in clusters at the ends of last year's branches, forming large cymes of white and pale pink. Each flower is a study in itself and most difficult to draw or paint, on account of the numerous ridges and projections on the outside of the buds and the delicate curves and depressions of the open flower.

The pedicels are about one inch long, and glandular hairy; the calyx is also glandular and small, with five narrow sepals; the corolla has a short basal tube and ten prominent dorsal ridges, five of which are longer and also glandular, the limb is five-lobed with shallow notches between the lobes and ten dark red blotches, marking the indentations in which the anthers are held; the filaments are white and curved. They spring upward around the pistil, if suddenly released by the visit of a bumble-bee, or other large insect, dusting his back with a white pollen which escapes from the anthers, through two apical pores. The pistil is at first curved, later becoming erect, with five greenish-yellow stigmatic surfaces and a superior glandular ovary, which develops into a five-lobed capsule. An unusual form of the laurel has been found near Deerfield, Massachusetts, with the corolla divided to the base into five long narrow petals. This freak has been cultivated, though not nearly as beautiful, and produces seed.

The leaves are thick and glossy and keep their dark green color and brilliancy throughout the winter. They are from two to five inches long and sometimes nearly two inches wide and when young have minute black glandular hairs on the upper surface; the petioles are short and thick, opposite or alternate and clustered at the ends of the branches, which are stout and woody, often spreading and usually making a small dense shrub about two to six feet high. Rarely, in sheltered inaccessible valleys of the southern Alleghanies, it is said to become a tree having a trunk thirty to forty feet high with a diameter of 18 inches; but this is probably a thing of the past.

The laurel is usually found on rocky or barren soil in hilly regions, ranging from New Brunswick and Ontario southward to Florida and Louisiana and blooms in May to July according to its range.

The earliest account of *Kalmia latifolia* appeared in 1705 in the "Almatheum Botanicum" of Plukenet, who figured it very poorly and it was named by Linnaeus in 1753. It was also described and figured in a colored plate by Marc Catesby in 1771 in his Natural History of Carolina, Florida and the Bahama Islands, who introduced it into cultivation. The following is his account:

"As all plants have their peculiar beauties, it is difficult to assign to any one an elegance excelling all others; yet, considering the curious structure of the flower, and beautiful appearance of this whole plant, I know of no shrub that has a better claim to it. After several unsuccessful attempts to propagate it from seeds, I procured plants of it at several times from America, but with little better success; for they gradually diminished, and produced no blossoms, till my curious friend, Mr. Peter Collinson, excited by a view of its dried specimens and description of it, procured some plants of it from Pennsylvania; which climate being nearer to that of England, than from whence mine came, some bunches of blossoms were produced in July, 1740, and in 1741, in my garden at Fulham."

The laurel belongs to the *Ericaceae*, or Heath family, as do the azaleas, rhododendrons, blueberries and arbutus, and it has been conclusively shown by Mr. Coville, Botanist of the United States Department of Agriculture in Washington, that what they need for successful cultivation, is an acid soil and an abundance of leaf mould. The arbutus has been grown in pots from seed and it may be that at no distant date, it may be forced as tulips and hyacinths are now, for Easter. Rhododendrons and laurel are being shipped in carload lots by dealers from the mountains of Pennsylvania and the southern Alleghanies, who supply florists and nurserymen from wild sources. How long can they last?

ELIZABETH G. BRITTON.

THE HICKORY BARK-BEETLE

WITH PLATES CXVIII AND CXIX

For several years past the hickories have been dying at an alarming rate in the northern and eastern United States, and in fact almost throughout the range of the growth of these trees. The city parks, including the New York Botanical Garden, have suffered their share of the loss. While there may be a complication of causes it is usually agreed that the bark-beetle is responsible for a large part of this loss.

MEANS OF DETECTING ITS PRESENCE

One of the first evidences of the presence of this insect is the premature dying and falling off of the leaves of the trees in mid-summer, July and August. Frequent inquiries as to the cause of this premature defoliation of the hickories have been referred to the Garden during the past summer. The leaves may fall to the ground or may be only partially detached and remain hanging in a dead condition, greatly injuring the appearance of the tree. If the fallen leaves are closely examined it will be found that there is a small cavity at the base of the petiole which has been made by the adult beetle, which feeds upon the buds and soft tissues of the smaller branches of the tree. These cavities so weaken the petioles that the leaves are easily broken from the tree by the wind. If the insect would confine its attacks to the smaller branches, twigs and leaves the damage resulting from its work would be comparatively slight, but they also attack the large branches or main trunk and it is here that the principal part of the damage is done.

LIFE HISTORY AND HABITS

The adult beetles emerge in June or early July and feed upon the smaller branches or bore directly into the bark of the tree. Both the males and females enter the tree, the males for food and the females to deposit their eggs. In depositing her eggs the female confines herself to the main trunk or larger branches. The hole through which she enters is bored inward and upward.

An isolated hickory tree (*Hicoria ovata*) in a normal and healthy condition as indicated by the absence of dead branches.

Just under the bark an egg-gallery often an inch or more in length is worked out. The eggs are deposited on each side of this cavity and range in number from twenty to forty or fifty to each adult. The female usually dies after depositing her eggs and her remains can often be found in the old egg-gallery. The larvae, small white grubs, hatch in a short time and immediately begin to work their way outward between the bark and the wood, each larva making a separate burrow, which grows larger as they proceed outward on account of the increase in the size of the larvae. They remain in the burrows over winter and emerge in the adult form the following June or July, thus completing the life cycle.

They are often present in such large numbers that the entire bark is almost severed from the tree and the exit holes are so numerous that the large branches often appear to have been filled with buckshot.

The work of this insect in the branches or main trunk of the tree results in a partial or entire girdling of the tree according to the number of insects present. This results in the dying of the part of the tree attacked. The trees are not usually killed outright but larger branches are often attacked and killed first, the work gradually spreading to the entire tree.

Local Observation

In the inspection of the hickories in the Garden it has been difficult to find many of the larger and older trees which are not thoroughly infested by this insect. Among the large number of younger trees ranging from three to five inches in diameter comparatively few appear to have been attacked in their main trunks in such a way as to accomplish much damage. In the few cases in which young trees have been attacked the insects often appear to have died without emerging. In the rare cases in which the young trees are attacked the adjacent tree is often entirely free from the insect. The reason for this is not evident.

Natural Enemies

Among the natural enemies of this insect are birds, especially woodpeckers and species of ichneumon-flies. As to just how

much influence woodpeckers may have in holding this particular insect in check it is difficult to say. We find abundant evidence that these birds do work on the infested branches, but possibly in quest for other insects than the bark-beetles. There seems to be no reason however to assume that they do not feed on these beetles, since they can be easily reached in the summer when feeding the soft tissues of the tree and also when boring into the bark. The ichneumon-flies are said to parasitize the bark-beetles by depositing their eggs within the body of the insect, thus killing them before they have had a chance to emerge.

Artificial Means of Control

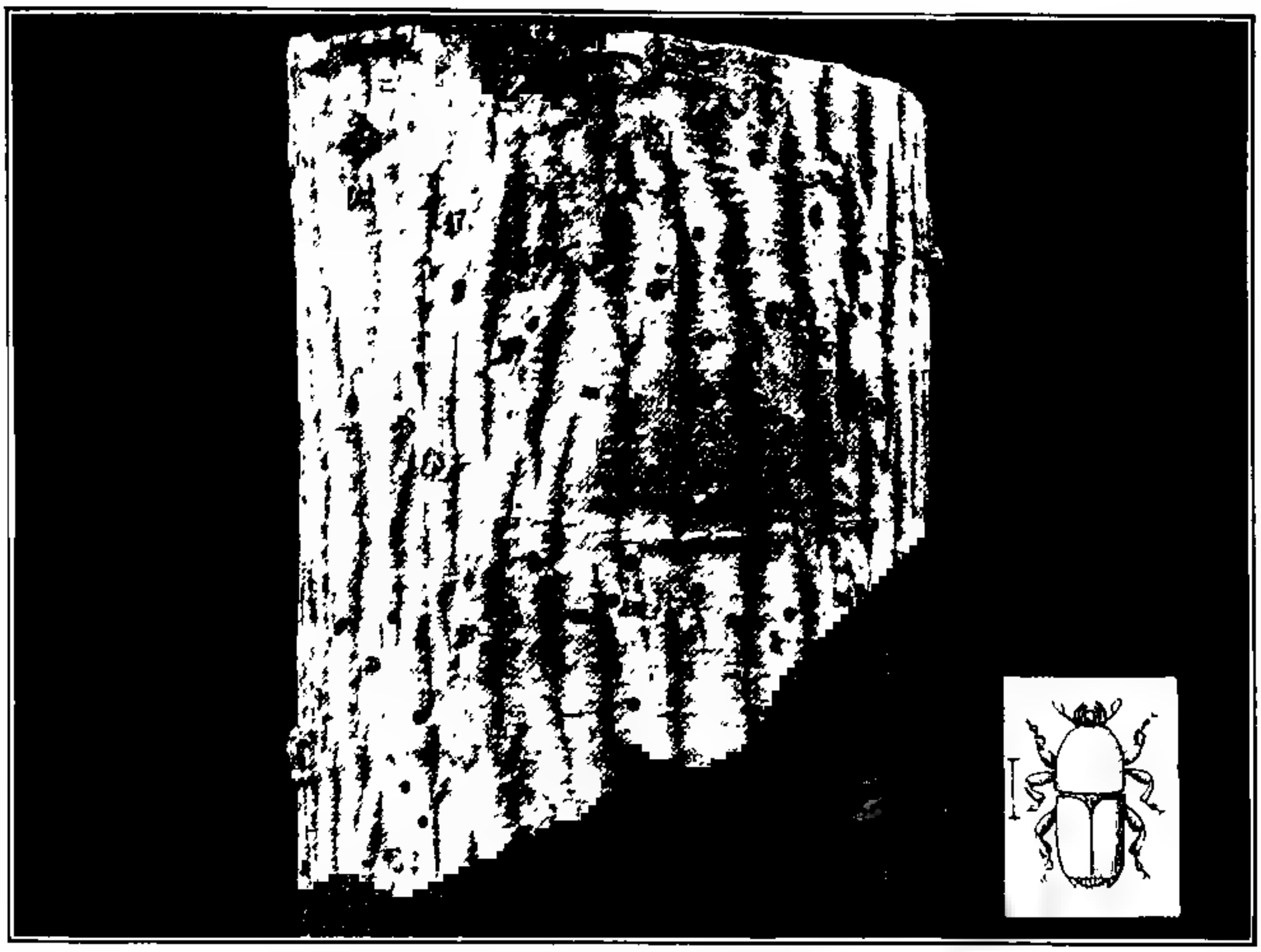
The means recommended by the Department of Agriculture for controlling this insect is the cutting down and destroying of all infested trees or parts of trees in order to reduce the number of insects. This must be done between October and May to catch the insects before they emerge.

The dead or dying hickories should be marked during the summer and fall in order to determine which trees are dead or partially dead. These may then be cut down during the winter and early spring. The infested trees or branches should be treated in such a way as to destroy the grubs present in or just under the bark. This may be done by removing the dark and burning it or by using the wood and bark for fuel. Spraying is not recommended for this insect.

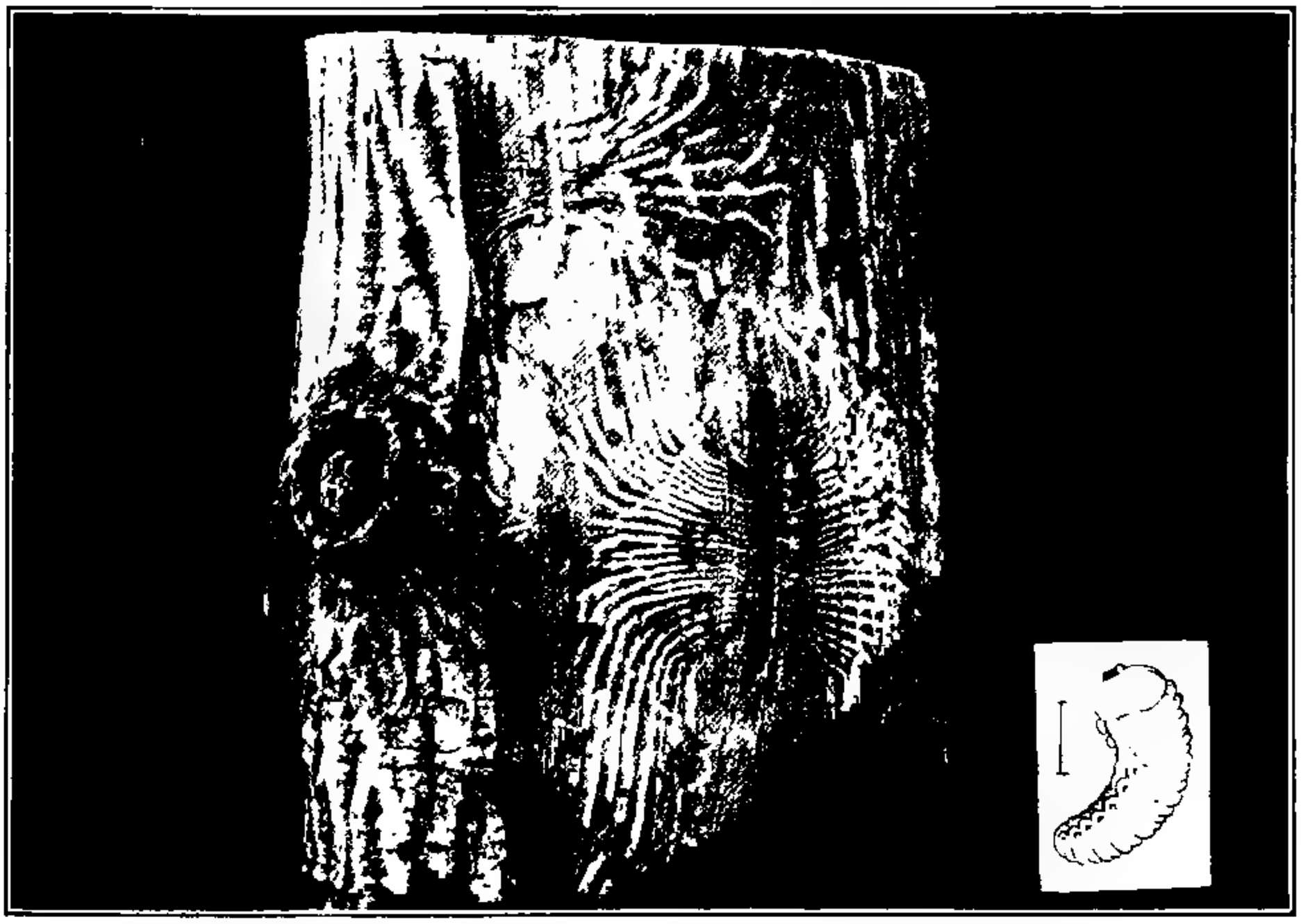
Fred J. Seaver.

THE MAY FLOWER EXHIBITION

The Horticultural Society of New York, in coöperation with the Garden, held an exhibition of plants and flowers in the Museum building, Saturday and Sunday, the tenth and eleventh. A large attendance was present on both days. The large center table in each end of the hall together with a number of smaller tables were filled with exhibits. Large collections of the flowers of shrubs and trees, tulips, and wild flowers were exhibited.



Branch from a hickory infested with bark-beetles showing exit holes and beetle. Beetle enlarged ; branch reduced nearly one half.



Infested branch with bark partially removed, showing galleries made by the adults and burrows made by the borer or larval stage of the beetle. Larva enlarged ; branch reduced nearly one half.

The collection of lilacs shown by Mr. T. A. Havemeyer, forming a part of his entry of flowers of shrubs and trees, was much admired. There were some striking forms among these, perhaps the most notable being Pasteur, with flowers of the deepest red-purple, fully one and a quarter inches in diameter. The Garden made a large display of the flowers of herbaceous plants, and also of shrubs and trees.

The display of calceolarias was excellent, and a fine group of pelargoniums added a touch of dainty color. The sweet peas shown by Mr. John I. Downey were of unusual merit and exhibited great skill in cultivation. The display of hybrids between *Primula polyantha* and *vulgaris*, exhibited by Mrs. A. M. Booth, was one of the attractions.

Following is a list of the prize-winners:

The first prize for a collection of the flowers of shrubs and trees went to Mr. T. A. Havemeyer, A. Lahodny, gardener, the second to the F. R. Pierson Co. Mrs. A. M. Booth, E. Fardel, gardener, secured first prize for a collection of tulips, Mr. Havemeyer taking the second. An interesting collection of wild flowers gave Mr. E. B. Southwick the first prize, the second going to John Hartling. Mrs. F. A. Constable, James Stuart, gardener, won the first prize with six pots of fine pelargoniums. This exhibitor also took the first prize for six pots of calceolarias, the second going to Mr. Louis C. Tiffany, John Miller, gardener.

Special prizes were awarded as follows: Wm. Kleinheinz, for six excellent plants of *Calceolaria Stewartii;* John I. Downey, Thos. Ryan, gardener, for a collection of Spencer sweet peas; Mrs. F. A. Constable, for six pots of *Calceolaria Stewartii;* Siebrecht & Son, for a hybrid of *Laelia purpurata* × *Cattleya Lawrenceana*, certificate of merit; Mrs. A. M. Booth, for a collection of hybrids of *Primula polyantha* × *vulgaris*.

The judges were F. R. Pierson, J. H. Troy, and George V. Nash.

George V. Nash.

NATURE-STUDY LECTURES DURING THE SPRING OF 1913

The nature-study lectures, with accompanying demonstrations, to the pupils of grades 4B and 5B of the public schools of the Bronx, which have been in progress for several years during the spring and fall months, were continued during April and May.

Weather conditions were most favorable during the entire course of ten lectures, none of which was postponed on account of inclement weather.

Lectures were delivered in the lecture hall of the Museum Building each day at 10:15 and 1:45, as follows:

Tuesday, April 22, "Seedless Plants," by Dr. M. A. Howe; Thursday, April 24, "The Cultivation of Plants," by Mr. G. V. Nash; Tuesday, April 29, "Plant Products," by Dr. H. H. Rusby; Tuesday, May 6, "Woody Plants and Plants Without Wood," by Dr. F. J. Seaver; Wednesday, May 14, "Classification of Plants," by Dr. N. L. Britton.

The accompanying table of attendance was prepared by Principal Stevens of Public School 44.

	A. M. Lectures		P. M. Lectures	
Teachers	——	64	——	75
Pupils, 4B	302	——	427	——
	378	680	418	845
Pupils, 5B	392	——	429	——
	341	——	380	——
	425	1158	390	1199
		1902		2119
Summary, Teachers		——		139
Pupils, 4B		1525		——
Pupils, 5B		2357		3882
Grand Total				4021

SUMMER LECTURES, 1913

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

June 7. "Summer Wild Flowers about New York," by Dr. N. L. Britton.

June 14. "Diseases of Fruit Trees," by Dr. Mel T. Cook.

June 21. "Some Scenic and Floral Features of Florida," by Dr. J. H. Barnhart.

June 28. "Botanical Expeditions to the Bahamas," by Dr. M. A. Howe.

July 5. "The Hempstead Plains: A Natural Eastern Prairie," by Mr. Norman Taylor.

July 12. "Swamps: Ancient and Modern," by Dr. Arthur Hollick.

July 19. "The Flora and Scenery of the Southern Rocky Mountains," by Dr. P. A. Rydberg.

July 26. "Water Gardens," by Mr. G. V. Nash.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. Doors closed at 4:00; late comers admitted at 4:15.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue.

NOTES, NEWS AND COMMENT

Mr. Guy West Wilson has been granted a scholarship for one month this summer to assist him in his studies on North American Peronosporaceae and in the preparation of manuscript on this group of plants for the North American Flora.

Mr. Maurice Picard, M.A. (Columbia 1911), has been elected assistant professor of botany in Middlebury College. Mr. Picard was a student at the Garden in the summer of 1912. During the past school year he has been the Golden Smith Fellow in Cornell University.

Dr. William A. Murrill, assistant director, will spend part of the summer in Europe prosecuting his studies of the larger fungi at several museums and in consultation with other experts, looking toward the completion of the manuscript for two parts of NORTH AMERICAN FLORA after his return. He will also arrange for additional exchanges of duplicate specimens with European institutions and will investigate the reported detrimental effect of dust from tar-surfaced driveways on vegetation in Paris.

Professor A. G. Tansley, of Cambridge University, England, editor of the New Phytologist, visited the Garden on May 12. Professor Tansley will spend the greater part of the summer in America visiting botanical centers and participating in the phytogeographical excursion which is planned for the summer.

Dr. E. P. Felt, state entomologist, visited the Garden on May 24. A trip was made through the hemlock grove and a number of observations made on the condition of the hemlocks with reference to the hemlock beetle and suggestions offered as to the treatment of this pest. He also went through the propagating house and noted the condition of the cactuses which have been subjected to serious infection by insects.

Professor Ezra Brainerd, of Middlebury College, Vermont, recently spent a day at the Garden examining violets in continuation with his studies in the genus *Viola*.

Through the kind liberality of Mrs. Florence Lydig Sturgis, the collection of Japanese flowering cherry trees presented by her two years ago has been supplemented by seventy-five additional specimens, most of which have been planted near those first given by her in the valley in the arboretum east of the Bronx River north of the Long Bridge. The trees planted two years ago flowered very freely and beautifully this spring and attracted much attention. The additional trees presented by Mrs. Sturgis are small, but should commence to show considerable bloom next year.

The Charles Finney Cox collection of Darwiniana, described in our January JOURNAL, has now been installed in a case built for it and placed in the library reading room. The privilege of consulting it has already been granted to several students, and its value as a practically complete collection of the published writings of Charles Darwin will constantly increase. The bronze statuette of Charles Darwin (item no. 199 of Dr. Barnhart's enumeration of the collection) is placed on top of the case.

The recent completion of eight new museum cases forming parts of two blocks in the economic museum has made possible the rearrangement and better display of the collection of fibers, fiber products and basketry and of food products, including the exhibition of many specimens which have been held in storage. The placing of these cases nearly completes the case equipment of the west half of the economic museum on the main floor of the museum building.

Dr. John K. Small, head curator of the museums and herbarium, has completed and published a second edition of his "Flora of the Southeastern United States." The first edition appeared in 1903; the second bears publication date April 23, 1913, and is an octavo volume of xii + 1394 pages describing 6,697 species within the area south of the southern boundaries of Virginia, Kentucky, Missouri and Kansas; a total addition of 333 species has been made in the second edition and largely from Dr. Small's personal explorations in Southern Florida, but also many from information obtained by other students.

The second edition of "Illustrated Flora of the Northern States and Canada," by Dr. Britton and the late Ex-Judge Addison Brown, was published by Charles Scribner's Sons on June 7, 1913. The work was essentially completed at the time of Judge Brown's death on April 9, but he did not see a bound copy. The second edition is issued in three volumes as was the

first; each volume has been considerably enlarged, the whole work much revised, and the type wholly reset. In the present edition 4,666 species are illustrated as against 4,162 species illustrated in the first edition.

Meteorology for May.—The total precipitation for the month was 2.14 inches. Maximum temperatures for each week were as follows: *92° on the 3d*, 81½° on the 6th, 83° on the 16th, 78° on the 25th, and 84° on the 31st. The minimum temperatures were 42° on the 1st, *33° on the 11th*, 43° on the 15th, 41° on the 20th, and 50° on the 30th.

ACCESSIONS

MUSEUMS AND HERBARIUM

717 specimens of mosses from the Philippine Islands. (By exchange with the Bureau of Science, Manila.)

3 specimens of hepaticae from Connecticut. (Given by Miss Annie Lorenz.)

4 specimens of *Taxus* and *Pteris* from Florida. (Given by Dr. N. F. Petersen.)

1 specimen of *Fraxinus Michauxii* from New Jersey. (Given by Mr. W. H. Lamb.)

2 specimens of *Matteuccia intermedia* from Darjeeling. (Given by Professor F. O. Bower.)

2 specimens of *Schistomitrium* from Java and Borneo. (By exchange with Dr. Max Fleischer.)

61 specimens of flowering plants from tropical Africa. (By exchange with the Royal Botanic Garden, Kew, England.)

2 specimens of mosses from Florida. (By exchange with Dr. A. F. Grout.)

1 museum specimen of stem of the Manna-ash from Italy. (Given by Mr. Carlo Zeimet.)

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JOURNAL

OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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JOURNAL

OF

The New York Botanical Garden

VOL. XIV July, 1913 No. 163

WILD PLANTS NEEDING PROTECTION*

9. "FLOWERING DOGWOOD" (*Cynoxylon floridum*)

WITH PLATE CXX

One of the new enemies of the dogwood is the automobile. It is not unusual in the vicinity of New York to see great branches torn off, with all the flowers drooping, being borne into the city, by people in automobiles. Such ruthless and wanton destruction of this most decorative tree of our woodlands and hillsides is unpardonable and should be punished as a misdemeanor, for it is undoubtedly true, in most cases, that the depredators do not own the trees that they destroy, and have taken the branches from either some public park or private land.

The dogwood attains a height of about 10–20 feet with a maximum trunk of 40 feet usually with low and broad, spreading branches. At the summit of each twig there is a cluster of small yellowish green flowers about twenty to thirty in number, surrounded by four large showy white bracts, which sometimes attain 2–3 inches in length and 1–2 inches in breadth. They are formed by the expansion of the involucre which surrounds the flowers in the bud. They are usually notched at the apex, often tinted with red and occasionally quite pink. The flowers are small, crowded together, with four recurved greenish yellow petals, attached in the mouth of the tubular 4-lobed calyx; the stamens are four, attached to and falling with the corolla and

*Illustrated by the aid of the Stokes Fund for the Preservation of Native Plants.

the ovary is inferior with two cells and the summit bears a fleshy yellow disc, surrounding the base of the pistil. The fruit is an ovoid drupe, bright scarlet when ripe, usually five to six in a cluster. They are eagerly eaten by birds in the autumn, and in this way the seeds are widely disseminated. The leaves are opposite, borne in pairs on lateral branchlets, with short petioles; they are ovate or oval, acute with a strong mid-vein and conspicuous lateral veins and quite entire. They are minutely hairy on the upper surface when young and pubescent particularly on the veins, beneath. The wood is fine-grained and is sometimes used as a substitute for box-wood.

The dogwood ranges from Maine to Florida, and in the Central States from Ontario to Texas, ascending the mountains of Virginia and in the Sierra Madre in Mexico. It was named by Linnaeus in 1753 from plants collected in Virginia and Carolina and was described by Plukenet in 1691 in his Phytographia probably from plants collected in Virginia by John Bannister. It has been in cultivation in England since 1730 and is greatly prized not only for its showy white masses of blossom in spring, but for the brilliant color of its foliage and fruit in the autumn. The rose-colored form was figured by Marc Catesby in 1771, and is highly esteemed in cultivation, occurring sparingly wild.

ELIZABETH G. BRITTON.

JOHN PIERPONT MORGAN

Mr. John Pierpont Morgan, an original incorporator of the New York Botanical Garden and a member of its Board of Managers since the organization of that Board in 1895, died at Rome, Italy, on March 31, 1913.

Mr. Morgan rendered the Garden great service during its entire history; he contributed liberally to its primary endowment and to other funds, served as its Treasurer from 1895 to 1899, and subsequently, until his death, as a member of the Finance Committee and of the Membership Committee. His valued advice on many topics was always gladly given, and he was consulted on all important financial questions.

Resolved: That by the death of Mr. Morgan the New York Botanical Garden has lost a valued friend, whose aid and advice were of great importance to the institution.

Resolved: That the Managers deeply deplore their loss and direct that this preamble and resolutions be entered on the minutes of the Board and that a copy be sent to his bereaved family.

Memorial and resolutions adopted by the Board of Managers April 24, 1913.

N. L. BRITTON,
Secretary.

THE LANTERN-SLIDE COLLECTION

The collection of lantern-slides of the Garden has rapidly increased during the past few years, largely due to the continuation of the Saturday afternoon public lectures during the summer months, for which many additional slides have been provided.

To facilitate the work of preparing a lecture, the slides are numbered in the order in which they are added to the collection and installed vertically in specially prepared cases with grooved shelves bearing the numbers of every fifth or tenth slide. The collection has been divided into colored and non-colored slides, each with an independent sequence and a separate alphabetic subject card catalogue. This, however, could be arranged to better advantage by having a single index, with colored cards or cards with colored margins to represent the colored slides, which are stored in light-proof cabinets.

The basis of the colored slide collection is the well-known photographic work of the late Cornelius Van Brunt, who was for several years Honorary Floral Photographer. This collection is regarded as a memorial of Mr. Van Brunt. Many of these slides represent single specimens of wild flowers or large colonies of plants found in the vicinity of New York City; others illustrate the scenery and plants of the Canadian Rocky Mountains, while still others are studies of cultivated plants.

The coloring of these slides by Mrs. Van Brunt is exceptionally

true to nature, and has given much pleasure to the pupils of the public schools of the Bronx in their Nature-Study work, as well as to those in attendance at the Saturday afternoon lectures; the collection is of high educational value and is being increased by Mrs. Van Brunt from time to time.

Additional slides, the work of several artists, have been added to this collection at various times, making a total of 2,231 subjects.

At present the non-colored collection is by far the larger of the two, containing 5,789 slides, the entire collection thus comprising 8,020 slides; its value is over $7,000. A large percentage of the non-colored slides have been made from negatives and films obtained by members of the following expeditions sent out by the Garden:

Montana, D. T. MacDougal, 1901.
Arizona and Sonora, D. T. MacDougal, 1902.
Florida, M. A. Howe, 1902.
Porto Rico, M. A. Howe, 1903.
Dominica, F. E. Lloyd, 1903.
Haiti, G. V. Nash, 1903.
Bahamas, G. V. Nash, 1904.
Arizona, Sonora, California and Lower California, D. T. MacDougal, 1905.
Bahamas, M. A. Howe and C. F. Millspaugh, 1905.
Bermuda, Stewardson Brown, 1905.
Haiti and Bahamas, G. V. Nash, 1905.
Porto Rico, M. A. Howe, 1906.
Southern Mexico, D. T. MacDougal, 1906.
Jamaica, M. A. Howe, 1906–1907.
Bahamas, M. A. Howe, 1907.
Jamaica, W. A. Murrill, 1908–1909.
Cuba, Jamaica and Florida, M. A. Howe, 1909.
Santo Domingo, Norman Taylor, 1909.
Southern Mexico, W. A. Murrill, 1909–1910.
Panama, M. A. Howe, 1909–1910.
Colorado, F. J. Seaver, 1910.
Cuba, C. S. Gager, 1910.

Mexico, H. H. Rusby, 1910.
Utah, P. A. Rydberg and A. O. Garrett, 1911.
Pacific Coast, W. A. Murrill, 1911.
Bermuda, Stewardson Brown, 1912.

There are also many uncolored slides of tropical fruits, flowers, economic plants, plant associations, landscapes of parks and botanical gardens.

With the present arrangement of lectures, more than one half of the slides are used in the course of a year.

The greatest need of the collection at present is an increase in the number of colored slides illustrating tropical and subtropical flowers, fruits, trees and landscapes. Many flowers of tropical and subtropical species are available as subjects in the greenhouses every year, and might be utilized if funds were available for photography and coloring. Some tropical fruits are also thus available, but trees and landscapes of warm countries can only be obtained by a colorist accompanying the botanist and photographer to the field, in order to ensure accuracy of determination of the subjects represented.

Negatives and films are also catalogued; there are many of these from which lantern-slides have not yet been made, which will provide valuable additions.

PERCY WILSON.

THE JUNE FLOWER EXHIBITION

The Horticultural Society of New York, in coöperation with the Garden, held its June exhibition in the Museum building, on Saturday and Sunday, the seventh and eighth. The prizes were offered by the Garden, to be awarded by the exhibition committee of the Horticultural Society. Large numbers visited the exhibition on both days to view the great collections of peonies and roses, the main features, and other displays of flowers and plants. Never before has there been such a fine display of roses at the June show. Nearly three hundred vases of this popular flower were on view, in flowers of the purest white, deepest pink, rose, all shades, crimson, yellow, salmon, in fact in

all the colors in which this flower occurs. Only hardy kinds were shown, so it was a demonstration of what can be done out of doors in the cultivation of this flower. There was a great display of peonies also, in many varieties and colors.

The flowers of choice shrubs and trees, including rhododendrons and azaleas, formed one of the attractions. Groups of herbaceous plants, including large collections of irises, added to the interest. There was a notable display of orchids for this season of the year, including some exceptionally fine forms of Cattleyas.

The New York Botanical Garden made a display of the flowers of herbaceous plants.

The competition in the roses was keen, there being four entries. The first prize went to a superb collection, ninety-three vases, exhibited by Mrs. Benj. Stern, of Roslyn, L. I., W. D. Robertson, gardener. The judges had considerable difficulty in deciding on the second prize, finally awarding it to Gen. E. A. McAlpin, of Ossining, N. Y., J. Woodcock, gardener, for an excellent collection of seventy-three vases, the closest competitor for the second prize being Mr. H. Darlington, of Mamaroneck, N. Y., P. W. Popp, gardener, with a collection of sixty-three vases.

Mr. T. A. Havemeyer, of Glen Head, L. I., A. Lahodny, gardener, won the first prize for a collection of peonies with a fine display of eighty vases, the second prize going to the F. R. Pierson Co. A collection of thirteen vases of single peonies brought the first prize to Mr. Havemeyer, the second to the F. R. Pierson Co. For six flowers each of white, light pink, and rose varieties, the first prizes were won by the Cottage Gardens Co., the second by Mr. T. A. Havemeyer, while the class of six crimson reversed these prize winners.

The choice collection, thirty-three vases, of flowers of shrubs and trees, secured the first prize for Mr. Havemeyer. In this display there were many excellent things, one of the most striking being *Deutzia cernata magnifica*, a recent production of Lemoine. This is a great advance over any of the other forms of this species. Other delightful things were: *Philadelphus Conquette; P. Virginal*, with large double flowers; *P. Bouquet Blanc; P. erecta; Styrax japonica*, with its dainty bells of white; *Kalmia latifolia*, in two

fine forms; *superba*, with large flowers, and *Pavardi*, with the flowers, especially in the bud, of a bright rosy pink. The second prize in this class went to Mr. H. Darlington. Mr. Havemeyer also took the first prize for a collection of rhododendrons and azaleas, the second going to the F. R. Pierson Co.

In the classes for herbaceous plants, Miss B. Potter, of Ossining, N. Y., Geo. Wittlinger, gardener, took the first prize for a general collection. In the irises, Mr. H. Darlington took first prize for a fine collection of Spanish iris, fourteen vases, showing some exquisite forms. The second prize for irises went to Mr. John Lewis Childs.

Among the orchids, Mr. Clement Moore, Hackensack, N. J., took the first prize for six orchid plants in six varieties, the second being won by Messrs. Lager & Hurrell. In the class of three orchid plants, three varieties, these prize winners were reversed, as was the case in the class of one orchid plant.

A number of special prizes were awarded, as follows: an excellent display of herbaceous plants, not for competition, exhibited by Messrs. Bobbink & Atkins, bronze medal; a so-called pink form of *Vanda coerulea*, exhibited by Mr. Clement Moore, certificate of merit; a fine hybrid of *Cattleya speciosissima* and *C. Dowiana*, raised and exhibited by Mr. Clement Moore, silver medal; a collection of Laelio-cattleyas and Cattleya hybrids, exhibited by Mr. Clement Moore, silver medal; three fine plants of *Fuchsia*, Mrs. F. A. Constable, Jas. Stuart, gardener; a plant of *Dendrobium Sanderae*, exhibited by Mr. W. A. Manda, silver medal.

GEORGE V. NASH.

NOTES, NEWS AND COMMENT

Mr. Lex R. Hesler, instructor in the Department of Plant Pathology of Cornell University, spent June 23 at the Garden looking over specimens of certain parasitic fungi in connection with his research work in pathology.

Dr. L. H. Pennington, professor of botany in Syracuse Uni-

versity, was in residence at the Garden during a part of June and July on a scholarship for a study of the fungi of the genus *Marasmius*.

During the past month, Mr. W. H. Long, forest pathologist in the Bureau of Plant Industry, made a careful study of the various species of fungi represented in the herbarium of the Garden which cause heart rot in deciduous trees.

Mr. Frank J. Kelly, assistant in experimental breeding at the University of Wisconsin, spent several days in June at the Garden in an examination of various letters in the collection of Darwiniana which contain original and unpublished data pertaining to the studies which Charles Darwin made of poultry and pigeons.

Francis E. Lloyd, A.M., MacDonald professor of botany in McGill University, Montreal, spent several days at the Garden about the middle of June.

Volume 15, part 1, of North American Flora was published June 14, 1913. It comprises 75 pages, and commences the treatment of the mosses. Sphagnaceae are by Dr. A. LeRoy Andrews, of Cornell University, and the remainder of this part chiefly by Mrs. Elizabeth G. Britton.

Dr. W. C. Coker, professor of botany at the University of North Carolina, was at the Garden during a part of June and July pursuing his studies on the Saprolegniaceae.

Dr. Homer Doliver House, a student at the Garden in 1903–04 and a museum aid 1907–08, has received the appointment of Assistant State Botanist of New York. Dr. House has for several years been associate director and lecturer on botany and dendrology of the Biltmore Forest School. The botanical collections of the State of New York are extensive and valuable; they have recently been moved into the new Educational Building at Albany, and their rearrangement will require a great deal of Dr. House's time.

Mr. Guy West Wilson, a student at the Garden and a museum aid in 1906–07 and a research scholar in 1913, has been appointed a Special Agent of the United States Department of Agriculture for the study of the chestnut bark disease, with work assigned at the New Jersey Agricultural Experiment Station at New Brunswick. Mr. Wilson has recently been assistant in vegetable pathology at the North Carolina Experiment Station.

An invitation was received by the Garden to participate in the bicentenary celebration of the foundation of the Imperial Botanic Garden at St. Petersburg, Russia, held in June, 1913. It was not possible to accept the invitation, but a congratulatory letter was written. This important institution has had an uninterrupted history since 1713, and has contributed greatly to the knowledge of plants of the Russian Empire and to the development of its natural resources. The New York Botanical Garden has had exchange arrangements with the St. Petersburg institution and our herbarium contains many specimens received in this way. We have also had several consignments of seeds, from which many plants have been grown.

The present summer drought is detrimental to newly established plantations and, although free use of hoses is being made, more or less loss of plants is apparently unavoidable. It is very interesting to observe how much more effective a shower is in reviving vegetation during a drought period than the water from hose-taps. This is, of course, known to every gardener, but the reason for it is not evident, because a plantation can be as thoroughly saturated by hosing as by atmospheric water. It would seem as though there must be some physical property of rain water which stimulates vegetation in a way which water from pipes does not.

On the other hand, the weather has been exceedingly favorable for haying and a large crop of hay has been secured and stacked, cut from parts of the arboretum grounds on the east side of the Bronx River and from the north meadows. More hay, indeed, has been secured than can be used to feed Garden horses during the next year.

A recent valuable accession to the palm collection consists of six large plants, twenty-five to thirty feet tall, the gift of Mrs. F. J. Shepard, who has in years past presented many other valuable plants to the Garden. This recent accession embraces five species, representing as many genera. One of these is *Cocos plumosa*, a native of Brazil. Then there are two specimens of *Dictyosperma album*, known also as *Areca alba*, which finds its home in the Mascarene Islands. A good plant of *Roystonea regia* is a third species. This is the royal palm, sometimes known as *Oreodoxa regia*, growing in southern peninsular Florida and the keys, and also in the West Indies and Central America. It is one of the most stately of palms, and odd in its curious swollen trunk. The two most important elements of this gift, as they represent species and genera not hitherto in the Garden collections, are *Clinostigma Mooreanum*, known also as *Kentia Mooreana*, an Australian palm; and *Kentiopsis macrocarpa*, sometimes known under the name of *Kentia Lindeni*, from New Caledonia. Plants of the size presented by Mrs. Shepard represent years of growth and are correspondingly valuable.

Meteorology for June.—The total precipitation for the month was only 0.63 inch. Maximum temperatures for each week were as follows: 85° on the 7th, 94° on the 14th, *96° on the 16th*, and 89° on the 29th. The minimum temperatures were 47° on the 2d, *46° on the 9th*, 50° on the 19th, and 56° on the 29th.

ACCESSIONS

MUSEUMS AND HERBARIUM

100 specimens "Fungi Columbiana" century 40. (Distributed by Elam Bartholomew.)

100 specimens "North American Uredinales" century 81. (Distributed by Elam Bartholomew.)

1 specimen of *Lepanthes obtusipetala* from Jamaica. (By exchange with the Department of Agriculture, Jamaica, West Indies.)

10 specimens of fungi from Porto Rico. (By exchange with Professor F. L. Stevens.)

4 specimens of *Lepidopilum* from Africa. (By exchange with the Natural History Museum, Paris.)

1 specimen of *Saffordia induta* from Peru. (By exchange with the United States National Museum.)

1 specimen of *Cololejeunea setiloba* from Florida. (By exchange with Dr. A. W. Evans.)

10 specimens of mosses from Mexico. (By exchange with Brother Leon.)

31 specimens of arctic plants collected by the Stefanson-Anderson expedition. (Given by Mr. R. M. Anderson.)

20 specimens of flowering plants from South Dakota. (By exchange with Professor W. P. Carr.)

4 specimens of hepatics from Porto Rico. (By exchange with Brother Hioram.)

1 specimen of *Thuidium nigeriae* from northern Nigeria. (Given by Mr. W. E. Nicholson.)

250 specimens of ferns and flowering plants from Colorado. (By exchange with Miss Florence Beckwith.)

25 specimens "Lichenes Suecici Exsiccati." (Distributed by Dr. G. O. A. Malme.)

PLANTS AND SEEDS

171 plants from Santo Domingo. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

121 plants from Curacao. (Collected by Dr. N. L. Britton and Dr. J. A. Shafer.)

198 plants from West Indies. (Collected by Dr. N. L. Britton.)

290 plants from West Indies. (By exchange with U. S. Nat. Mus. through Dr. J. N. Rose.)

3 plants from St. Jan. (Collected by Dr. N. L. Britton.)

115 plants from Porto Rico. (Collected by Dr. N. L. Britton.)

34 plants from St. Thomas. (Collected by Mrs. N. L. Britton.)

12 plants from St. Thomas. (Collected by Dr. & Mrs. Britton.)

12 plants and 4 cuttings from St. Thomas. (Collected by Dr. N. L. Britton.)

5 plants of *Trollius laxus*. (Given by Miss Kittredge.)

1 plant of *Sedum anopetalum*. (By exchange with Brooklyn Botanic Garden.)

10 bulbs of *Lilium* sp. (By exchange with Dept. Agric., Bureau of Plant Industry.)

125 plants for nursery. (By exchange with Buffalo Botanic Garden.)

4 plants of *Eremurus robustus*. (Given by Mr. B. Hoffmann.)

15 plants for conservatory. (By exchange with Dept. Agric., Bureau of Plant Industry.)

8 violets. (Given by Prof. E. Brainerd.)

2 violets. (Given by Mr. P. Dowell.)

176 opuntias. (Purchased.)

150 lily bulbs. (Purchased.)

29 plants *Abutilon*. (Purchased.)

424 plants for rose garden. (Purchased.)

1,494 plants for decorative collections. (Purchased.)

273 ferns for herbaceous grounds. (Purchased.)

10 *Pinus pungens*. (Purchased.)

75 Japanese cherry trees. (Given by Mrs. Florence Lydig Sturgis.)

6 plants *Drosera longifolia.* (Given by Dr. Mel. T. Cook.)

5 plants of *Ficus rubiginosa.* (By exchange with Dept. Agric., Bureau of Plant Industry.)

3 plants of *Bletia* from Guatemala. (Given by Dr. T. D. A. Cockerell.)

70 cactuses for conservatories. (By exchange with Nat. Mus., through Dr. J. N. Rose.)

1 plant *Epiphyllum crenatum.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

10 plants for conservatories. (By exchange with Mr. F. Lighte.)

44 plants for conservatories. (By exchange with Porto Rico Exp. Sta.)

1 cactus for conservatories. (By exchange with Fairmount Park, Phila.)

7 orchids. (By exchange with Mrs. B. B. Tuttle.)

1 opuntia from Bull Hill. (Given by Mr. R. Douglass.)

12 plants of *Hedychium.* (By exchange with Royal Gardens, Kew.)

5 cuttings *Cereus Wercklei.* (By exchange with Museo Nacional, Costa Rica.)

10 plants for conservatories. (By exchange with A. J. Manda.)

3 cuttings of *Pedilanthus.* (Given by Mr. W. H. Bemis.)

1 opuntia from Cuba. (Given by Bro. Leon.)

2,013 plants derived from seeds from various sources.

151 packets of seed. (By exchange with Budapest Botanic Garden.)

172 packets of seed. (By exchange with Royal Botanic Garden, Glasnevin.)

257 packets of seed. (By exchange with Botanic Garden, La Mortola.)

146 packets of seed. (By exchange with Botanic Garden, Lyon, France.)

23 packets *Digitalis* seed. (Given by Messrs. Eli Lilly & Co.)

39 packets of seed. (By exchange with Botanic Garden, Darmstadt.)

63 packets of seed. (By exchange with Botanic Garden, Bonn.)

53 packets of seed. (By exchange with Bot. Garden, Frankfurt.)

84 packets of seed. (By exchange with Botanic Garden, Zurich.)

29 packets seed. (By exchange with Botanic Garden, Nantes.)

86 packets seed. (By exchange with Botanic Garden, Prague.)

98 packets of seed. (By exchange with Botanic Garden, Heidelberg.)

73 packets of seed. (By exchange with Botanic Garden, St. Petersburg.)

24 packets of seed. (By exchange with Botanic Garden, Oxford.)

2 packets of seed. (By exchange with Botanic Garden, Portici.)

2 packets of seed from Colorado. (Given by Dr. T. D. A. Cockerell.)

8 packets of seed from Mexico. (By exchange with Dr. J. C. Harvey.)

1 packet of seed of *Aquilegia desertorum.* (Given by Dr. T. D. A. Cockerell.)

1 packet *Podocarpus* seed from Porto Rico. (Collected by Dr. N. L. Britton.)

2 packets date seed. (Given by Mr. Walter T. Swingle.)

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EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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TOMATO-NIGHTSHADE CHIMERAS. From left to right, *Solanum Gaertnerianum*, *S. Koelreuterianum*, *S proteus* and *S. tubingense*

JOURNAL

OF

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TOMATO–NIGHTSHADE CHIMERAS

WITH PLATE CXXI

Through the courtesy of Dr. Hans Winkler, director of the Hamburgische Botanische Staatsinstitute, the New York Botanical Garden has recently received two living plants of each of the tomato-nightshade chimeras known as *Solanum tubingense*, *S. proteus*, *S. Koelreuterianum* and *S. Gaertnerianum*. These plants have been supplied from Dr. Winkler's stock and are descended directly by means of vegetative propagation from the first of these chimeras produced by Dr. Winkler several years ago.

The production of these plants, together with the investigations which were thus stimulated, constitute a most important series of researches pertaining to the origin and the nature of plant chimeras and the possibility of the production of real graft-hybrids. These plants possess therefore an unusual interest to botanists, horticulturists and all others interested in the problems of heredity.

Previous to these investigations, there was much uncertainty concerning the origin and the nature of certain plants generally known as "graft-hybrids" or "mixed fruits," of which several forms were well known in horticulture.

One of these is the Bizzaria orange of which there are several types to be recognized. On these Bizzarias, there may be produced on some branches oranges, on other branches citrons, and on others fruits that are part orange and part citron. The first Bizzaria apparently appeared in Florence, Italy, about 1644. For a time the plant was quite generally propagated by budding

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and by grafting and was grown in the gardens of Florence for its decorative value. It was described by certain botanists and horticulturists as a sex-hybrid and by others as a graft-hybrid. A search in the older literature has shown that an early account of its origin states that the first branch came from a callus at the base of the dead scion of a graft between the orange and the citron.

Another so-called graft-hybrid originated in 1825 in the garden of a French gardener by the name of M. Adam. From a graft of *Cytisus purpureus* on *Laburnum vulgare* a branch arose that was somewhat intermediate in character between these two species. This branch was propagated by grafting. The plants thus produced gave some branches that were pure *Cytisus purpureus*, others that were partly *C. purpureus* and partly *L. vulgare* and still others that were intermediate in character. This interesting plant led to much discussion among botanists and horticulturists. Some claimed that it was a vegetative hybrid resulting from the actual fusion of two different kinds of cells which met at the juncture of the scion and the stock, while others, among whom were several eminent botanists, considered that the branch used as a scion by M. Adam was itself taken from a plant that was a sex-hybrid between the two species involved in the graft.

Several types of supposed graft-hybrids between the white-thorn (*Crataegus monogyna*) and the medlar (*Mespilus germanica*) were also well known. In the growth of these there is seen the same sorts of development with reference to the characteristics of the two parents as are noted in the plants of *Cytisus Adami*.

The first step in determining the nature of such "mixed plants" was to actually produce them under observation and control. By a very simple but ingenious method of experimentation, Dr. Winkler undertook to do this. He used the tomato and the nightshade, two distinct and well-known species with marked differences in leaves, flowers and fruit. He made reciprocal grafts, using the cleft or saddle-graft. When the scion was well established he decapitated the branch cutting through the points of contact between the scion and the stock, thus exposing on the

cut surface the two kinds of tissue and the two lines of contact between them. On this surface a callus formed from which buds arose. If a bud arose entirely from the portion that was nightshade the branch was purely a nightshade in its characteristics; if from a segment of tomato tissue the branch was pure tomato. If, however, a branch arose over the line of juncture it was composed partly of tomato and partly of nightshade tissues.

Such branches were named "chimeras." The simpler of these show vertical lines of differentiation; one side bears tomato leaves, flowers and fruits, while the other side of the branch bears the vegetative and floral organs of the nightshade. Leaves on the exact line of juncture are part tomato and part nightshade in character. In a cross section of the main stem the tissue of each component occupies a segment or sector. Such branches and the plants grown from them are therefore known as sectorial-chimeras. In such an association of two kinds of cells, each sort retains its own individuality and the vegetative and floral structures of each side are readily identified. None of these purely sectorial-chimeras exhibit the intermediate character observed in the supposed graft-hybrids.

In 1909, however, Dr. Winkler obtained an adventitious branch which when propagated produced plants having leaves, flowers and fruit which were different from either those of the tomato or of the nightshade. This new form was named *Solanum tubingense.* The general appearance of this type is intermediate between the tomato and the nightshade. The leaves are simple, sharply serrate and often lobed much like the leaflets of the tomato plant. The stems and leaves are hairy like the tomato. The corolla and calyx are larger than those of the nightshade but smaller than those of the tomato. The fruit is slightly larger than the fruits of the nightshade, which are much smaller than the fruits of the variety of the tomato used in the graft. Many of the fruits of this type are sterile but several generations of seedlings grown from seed have been pure nightshade and are not like the plants *Solanum tubingense* from which they were derived.

In continuing his experiments Dr. Winkler soon obtained the three other types of tomato-nightshade chimeras shown in

the plate illustrating this article. *Solanum Gaertnerianum* resembles the nightshade more than the tomato. The leaves are less entire than those of the nightshade. The flowers are greenish in color and are dwarfed, the petals remaining rudimentary. This form fruits sparsely but some seeds are perfectly developed and produce pure nightshade plants.

In general shape the leaves of the form *Solanum Koelreuterianum* resemble strongly the tomato, but the epidermis is free of hairs like the nightshade. The flowers are white with yellow middle streaks. The fruit does not mature. This particular type has appeared several different times.

The form called *Solanum proteus* also resembles the tomato more than the nightshade, although not to the extent of leaf shape seen in *S. Koelreuterianum*. The stems and leaves are hairy. The fruits produced are smaller than those of the tomato, but resemble them in form.

The production of these types of plants, each readily distinguished from the other, and from the tomato and the nightshade, aroused anew the interest in plant chimeras and graft-hybrids. Their general intermediate character seemed strong evidence in support of the view that they were all true graft-hybrids, resulting from a fusion of the vegetative cells of the tomato and the nightshade, the fusion occurring on the region of the contact of stock and scion.

About this time certain investigations by Dr. Erwin Baur on the white margined varieties of *Pelargonium* plants showed that these plants with white-bordered leaves have peripheral layers of white cells covering the inner green tissue. Such plants consisting of two kinds of cells with a peripheral distribution of one were named *periclinal chimeras*. It was suggested that the supposed tomato-nightshade graft-hybrids were in fact periclinal chimeras. After making careful anatomical and cytological examination of them, Dr. Winkler reported that the four forms described above are periclinal chimeras. *S. tubingense* and *S. proteus* have a nightshade body covered by tomato cells. The reverse is true of *S. Gaertnerianum* and *S. Koelreuterianum*. It appears that *S. tubingense* has a single peripheral layer of tomato

cells, while *S. proteus* has two such layers and that *S. Gaertnerianum* has two peripheral layers of nightshade cells, while *S. Koelreuterianum* has but one such layer.

Similar investigations on *Cytisus Adami* and the supposed *Crataegus-Mespilus* graft-hybrids have shown that these are also peripheral chimeras with one or more cell-layers of one species growing over a body of cells of the other species.

These studies have made clear the essential nature of these interesting plants and explain the various phenomena which they exhibit. The frequent reversion of branches to one or the other of the pure parental stock is due simply to a readjustment of the cells in the growing point so that one kind of cell develops to the exclusion of the other and the chimeral relationship does not exist in such a branch. As has been noted, the seedlings obtained from peripheral chimeras do not behave like the progeny of sex-hybrids, but are pure for one or the other of the parents. *S. tubingense*, for example, gives seeds that develop into plants that are pure nightshade. It is a well-known fact that in these plants the cells which form the embryo of the seed originate in the subepidermal layer of cells. If, as in the case of *S. tubingense*, but one peripheral layer is composed of tomato cells, the embryo is pure nightshade. In the case of *S. proteus* there are two peripheral layers of tomato cells, the germ cells are pure tomato and the seedlings are tomato plants.

In the union of stock and scion in the ordinary graft there is rather a limited region of contact of the two kinds of cells. In a sectorial chimera there is a much greater extent of contact and in the peripheral chimera there is a still greater amount of contact. In the tomato-nightshade periclinal chimeras many thousands of tomato cells and nightshade cells are joined side by side. This rather intimate association of two kinds of cells in a single stem, leaf, flower and fruit is interesting in view of the mechanical and physiological interactions which may take place.

While the evidence indicates that the two kinds of cells remain entirely independent in their essential hereditary characters, they do interact, producing cell complexes that are intermediate in character. Furthermore, a slightly different arrangement of the

same kinds of cells produces vegetative and floral structures that are quite different in appearance, a fact well illustrated by the leaves possessed by the four plants shown in Plate CXXI.

While the investigations indicate that the supposed graft-hybrids mentioned in this brief survey are in nature periclinal chimeras, the production of a true graft-hybrid due to vegetative cell-fusion is still to be considered possible. In fact, Dr. Winkler has presented proof that such is the case with the plant *Solanum Darwinianum*, which appeared on an adventitious branch that arose from a decapitated graft. It appears that certain if not all of the tissues of this plant are composed of cells derived from the actual fusion of tomato with nightshade cells which involved also nuclear fusion. This is at the present time the only true graft-hybrid known.

The four types of solanum-nightshade chimeras especially noted in this article will be propagated along with other plant chimeras at the New York Botanical Garden in the effort to make a representative collection of these interesting plants for display.

A. B. STOUT.

THE PROTECTION OF OUR NATIVE PLANTS

In August, 1901, the Misses Olivia and Caroline Phelps Stokes presented to the New York Botanical Garden a fund of $3,000, the interest of which was to be used for the protection of native plants. Various methods have been tried, beginning with a series of three prizes for essays on this subject, offered first to the teachers and older persons, which resulted in a good series of essays, the best of which were printed in the JOURNAL OF THE NEW YORK BOTANICAL GARDEN in 1902 and 1904. The prize essays were written by Dr. F. H. Knowlton, U. S. National Museum, Washington, D. C.; Miss Cora H. Clarke, daughter of James Freeman Clarke, of Boston; Dr. A. J. Grout, boys' high school, Brooklyn; Miss Mary Perle Anderson, supervisor of nature study, University School for Girls, Chicago, Ill.; Miss Jean Broadhurst, of Teachers College, N. Y. C.; and Mr. G. Gordon Copp.

In 1910 another series of smaller prizes were offered to students in the high schools, and these were won by students from the Washington Irving High School; the boys' high school, in Brooklyn and the Morris High School, Bronx.

Through the interest of one of the members of the board of education who was also a member of the staff of the New York Botanical Garden the following wild flowers were eliminated from the list of botanical supplies in the New York public schools: trailing arbutus, wild columbine, fringed gentian, hepatica, Indian turnip, moccasion flower, trillium, wild orchid; and it has also been proposed to substitute cultivated plants for wild ferns, Solomon's seal, wild geranium and others.

During the year 1912 and the present year, the interest of the Stokes' Fund has been used for colored illustrations for a series of essays on "Wild Plants Needing Protection" and has included (1) the Jack-in-the-pulpit; (2) spring beauty; (3) wild pink; (4) wild columbine; (5) bird's foot violet; (6) wild azalea; (7) moccasin flower; (8) dog-wood and (9) laurel. The essays have been reprinted and may be had at a nominal price from the New York Botanical Garden. Extra copies of the colored plates have been made and are to be distributed to the schools of New York City for framing.

Lectures have also been given under the auspices of the Garden and the expenses of a lecturer paid to visit various cities. In this way a general interest has been aroused, which has resulted in the foundation of the "Wild Flower Preservation Society of America" with a large membership in various cities of the east. Local chapters have been organized in several of them, and further information may be had on application to

MRS. N. L. BRITTON,
Secretary-Treasurer.

THE JULY FLOWER-EXHIBITION

An exhibition of plants and flowers was given by The Horticultural Society of New York, in coöperation with the Garden, in the Museum building, on Saturday and Sunday, July 5 and 6.

Prizes were offered for roses, Japanese irises, sweet peas, herbaceous plants, shrubs and trees, and vegetables.

There were some excellent sweet peas shown. In the open-to-all classes, for six vases, six varieties, twenty-five of each, the first prize was won by Miss M. T. Cockcroft, of Saugatuck, Ct., Adam Paterson, gardener, the second by Miss B. Potter, of Ossining, N. Y., Geo. Wittlinger, gardener. The vase of sweet peas, one hundred sprays, one or more varieties, exhibited by Mr. John I. Downey, Portchester, N. Y., Thos. Ryan, gardener, secured the first prize, the second being won by Miss Cockcroft. In the non-commercial classes, the three vases of sweet peas, three varieties, twenty-five of each, displayed by Mr. Downey obtained the first prize, the second going to Miss Cockcroft.

There were three competitors for the collection of herbaceous plants. A fine lot of flowers brought the first prize to Mrs. F. A. Constable, of Mamaroneck, N. Y., Jas. Stuart, gardener, the second prize being won by Mr. Geo. D. Barron, of Rye, N. Y., Jas. Linane, gardener. Mr. T. A. Havemeyer, of Glen Head, N. Y., A. Lahodny, gardener, captured the first prize for a collection of shrubs and trees, Mr. Barron the second. Six vases of Japanese irises, six varieties, gave Miss Cockcroft the first prize. For twelve different vegetables Miss Potter won the first prize, and for six different vegetables the first prize was secured by Mr. Havemeyer.

A special prize was awarded to Miss Cockcroft for a vase of gardenias, and to Mr. Max Schling a diploma for a flower basket.

The judges were Jas. Stuart, M. C. Ebel, Adam Paterson, and George V. Nash.

GEORGE V. NASH.

LATE SUMMER LECTURES

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

August 2. "American Desert Plants," by Dr. William Trelease.

August 9. "The Biology of Cheese," by Dr. Charles Thom.

August 16. "Wild Flowers of Late Summer," by Dr. N. L. Britton.

August 23. "Explorations in Mexico—II. Mexico City to Cuernavaca," by Dr. W. A. Murrill.

August 30. "The Mammoth Trees of California," by Dr. Arthur Hollick.

September 6. "Shade Trees and Their Enemies." by Dr. F. J. Seaver.

September 13. "A Visit to the Panama Canal Zone," by Dr. M. A. Howe.

September 20. "Scenic and Botanical Features of Devil's Lake, Wisconsin," by Dr. A. B. Stout.

September 27. "Explorations in Mexico—III. Colima and Manzanillo," by Dr. W. A. Murrill.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. Doors closed at 4:00; late comers admitted at 4:15.

The Museum building is reached by the Harlem Division of the New York Central and Hudson River Railway to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park. Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue. Those coming by the New York, Westchester and Boston Railway change at 180th Street for crosstown trolley, transferring north at Third Avenue.

NOTES, NEWS AND COMMENT

Dr. Frank Dunn Kern, a research scholar at the Garden during periods from 1906 to 1911, has been elected professor of botany at the Pennsylvania State College.

Dr. William Trelease, recently elected professor of botany at the Illinois State University, spent about three weeks during the summer at the Garden in continuation of his studies of American mistletoes (genus *Phoradendron*) and of Mexican oaks.

Dr. J. N. Rose, Research Associate of the Carnegie Institution of Washington, is spending considerable time at the Garden this summer in continuation of the joint investigations of the cactus family commenced in 1912.

Mr. Earl E. Sherff, a student of the genus *Bidens*, spent a week at the Garden in July investigating the herbarium collections of these plants, in continuation of work previously carried on by him at the Field Museum of Natural History in Chicago, the Missouri Botanical Garden and other institutions. It was gratifying to learn from Mr. Sherff that the collections of the Garden furnished him a very large amount of information which he had not obtained at other places.

Mr. Joseph Gilman, of the agricultural experiment station at Madison, Wisconsin, spent the month of August at the Garden on a scholarship grant for the study of the flowers of *Cichorium Intybus*.

An International Phytogeographic Excursion in America, organized by Professor Henry C. Cowles, of the University of Chicago, and Frederic E. Clements, of the University of Minnesota, commenced its observations in New York and vicinity on July 27, on which day a visit was made to the Brooklyn Botanic Garden and to the Hempstead Plains of Long Island. The pine barrens of New Jersey were visited on July 28 and 29, and July 30 was devoted to a visit to Columbia University in the morning and to the New York Botanical Garden in the afternoon, the party leaving for the West at midnight of that day. The route is by Niagara Falls, Chicago and vicinity, Lincoln, Nebraska, points in Colorado, Utah, Washington, and California, reaching the Desert Laboratory of the Carnegie Institution at Tucson, Arizona, on September 20. The program at the Garden on July 30 included lunch at Dr. Britton's house, an inspection of the museums, laboratories, library and herbarium, visits to the collection in all greenhouses and to a number of points in the grounds, escorted by members of the Garden staff, closing with

dinner at the Hermitage Hotel in the evening. The European visitors included Dr. and Mrs. Brockmann-Jerosch, of Zürich, Switzerland, Mr. C. B. Crampton, of the Geological Survey of Great Britain, Dr. Ove Paulsen, of Copenhagen, Dr. Eduard Rübel and Professor Carl Schröter, of Zürich, Dr. T. J. Stomps, of Amsterdam, Mr. and Mrs. A. G. Tansley, of Cambridge, England, and Professor C. von Tubeuf, of Munich.

Tulip trees would appear, from experience on the grounds of the Garden, to be more likely to be struck by lightning here than any others. At least eight of these trees have been struck during the past ten years and have subsequently died. The last one damaged was during a storm in June; this tree stands near the south side of the driveway east of the Long Bridge, and the effect of the lightning on its trunk is very evident. A few years ago, another individual which stood within a hundred feet of this one was killed by lightning. The tulip tree is the tallest and most massive tree of our region. Whether its wood has any attraction for electric discharges, or whether the form of the tree is the attractive feature is unknown. The destruction has not been confined to very large trees, as some of relatively small size, with trunks not over a foot in diameter, have been shattered.

Meteorology for July.—The record of the rainfall at the Garden for July 18 and 19 was lost. The record at the municipal building at Tremont Avenue for that date was 0.29 inch. Including this figure, the total precipitation at the Garden for the month was 4.06 inches. Of this amount, 1.87 inches fell on the afternoon of July 28, mostly between 3:45 and 4:30, in an unusually severe storm. Maximum temperatures for each week were as follows: *98° on the 2d*, 92° on the 13th, 89° on the 22d, and 97° on the 30th. The minimum temperatures were 55° on the 7th, *54° on the 8th*, 56° on the 15th, and *54° on the 26th*.

ACCESSIONS

MUSEUMS AND HERBARIUM

33 specimens "Ascomycetes," fascicle 52. (Distributed by Dr. Henrich Rehm.)

2 specimens of *Peronospora* from the United States. (Given by Mr. Guy West Wilson.)

6 specimens of fungi from Hudson Falls, New York. (By exchange with Mr. Stewart H. Burnham.)

25 specimens "Mycotheca Boreali-Africana," fascicle 4. (Distributed by René Maire.)

14 specimens of fungi (Geoglossaceae) from Virginia. (By exchange with Mr. W. H. Long.)

75 specimens of fungi (Discomycetes) from New York. (Collected by Dr. Fred J. Seaver.)

213 specimens of fungi and slime-moulds from Porto Rico. (By exchange with Mr. J. R. Johnston.)

1 specimen of *Chamaecistus procumbens* from Alaska. (By exchange with Professor T. C. Frye.)

19 specimens of flowering plants from Australia. (By exchange with Dr. H. H. Rusby.)

7 specimens of mosses from New Caledonia. (By exchange with Brother Leon.)

310 specimens of flowering plants from Missouri. (Distributed by Mr. B. F. Bush.)

1 specimen of *Antennaria Farwellii* from Michigan. (Given by Mr. O. A. Farwell.)

14 specimens of flowering plants from California. (Given by Mr. S. B. Parish.)

1 specimen of mango "No. 11" from Jamaica, West Indies. (Given by Dr. Maria Brockmann-Jerosch.)

85 specimens of *Agalinis* and related genera from the coastal plain of the eastern United States. (Given by Mr. Francis W. Pennell.)

10 specimens of mosses from Porto Rico. (By exchange with Brother Hioram.)

15 specimens of crude drugs. (Given by Dr. H. H. Rusby.)

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NEW YORK BOTANICAL GARDEN
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JOURNAL

OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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Pot-hole in hemlock grove near the boulder bridge.

JOURNAL

OF

The New York Botanical Garden

VOL. XIV September, 1913 No. 165

POT-HOLES IN THE NEW YORK BOTANICAL GARDEN

WITH PLATES CXXII, CXXIII AND CXXIV

In the minutes of the meeting of the New York Academy of Sciences, held on June 5, 1882, may be found a record which possesses an historical interest in connection with the New York Botanical Garden. This record, as printed in the Transactions of the Academy, Volume I, page 181, begins as follows:

"Dr. N. L. Britton read the following paper:

ON SOME LARGE POT-HOLES, NEAR WILLIAMSBRIDGE, NEW YORK.

The "pot-holes" which I shall attempt to describe were brought to my notice by the late Professor A. Wood. They are located on the western bank of the Bronx River, about midway between Bronxdale and Williamsbridge, Westchester County, New York. They are near the western end of a now dismantled and impassable bridge, with stone abutments, and in the northern part of a hemlock grove which fringes the stream for about a mile below. It is one of the most picturesque spots in the vicinity of New York City, and a walk along the little river from Bronxdale to Williamsbridge is always enjoyable. . . ."

So far as the writer is aware, this paper contains the earliest published description of these interesting natural features, and if we replace the phrase "a now dismantled and impassable

[JOURNAL for August, 1913 (14: 145–156) was issued August 28, 1913]

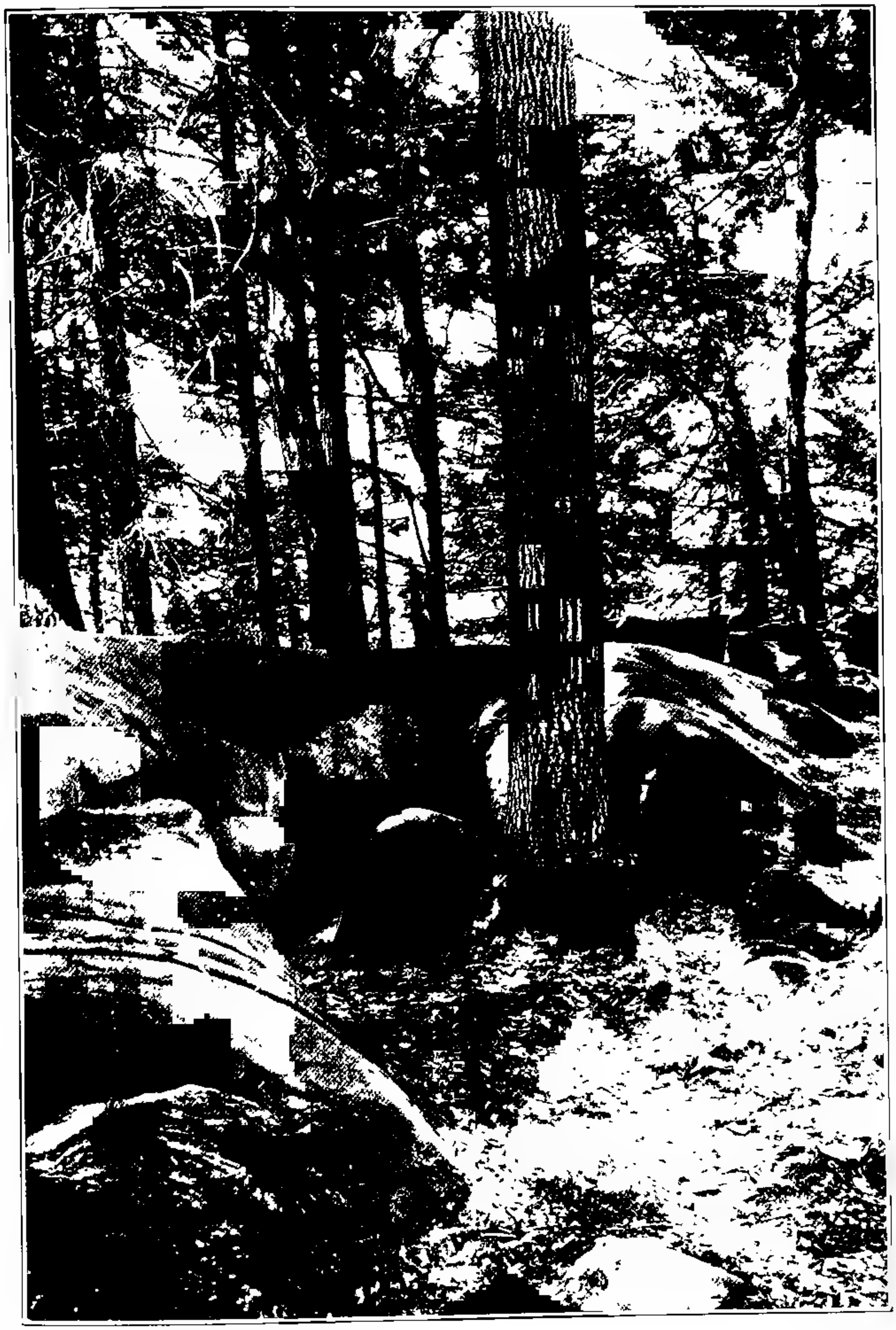
bridge, with stone abutments" by the designation "the Boulder Bridge," the location of the pot-holes in the hemlock grove within the Garden boundaries may be readily recognized.

After a lapse of about fourteen years they were further described and discussed, by Professor James F. Kemp, in a paper entitled "The Glacial or Post-Glacial Diversion of the Bronx River from Its Old Channel."* This paper, and the one first mentioned, include descriptions of the general geology of the region and discussions of the probable geologic age of the pot-holes, and those who may be interested in the details of this phase of the subject may refer to them for information in this connection. The present contribution will be restricted to descriptions and illustrations of three pot-holes within the Garden area. These are, apparently, known to comparatively few persons, while to the casual visitor, even when noticed by him, their origin is not always understood and their significance is seldom appreciated.

Pot-holes are bowl- or basin-like depressions in rock, caused by the abrasive action of gravel or cobble stones when churned around in the depressions by rapidly moving water. A pot-hole has its beginning in an irregularity or inequality in the rock bed of a stream, in which gravel or perhaps a single cobble stone or other rock fragment finds logdment. If the conditions are favorable, so that the foreign material is free to move and the current of the stream is sufficiently rapid to churn or swirl it around, the original inequality in the stream bed becomes deeper and more or less circular in shape, from the abrasive action of its contents, and a pot-hole is formed. A pot-hole, therefore, no matter where it may be located, is definite evidence that the rock in which it was excavated must have been, at some time, a part of the bed of a rapidly flowing stream.

There are three well-defined pot-holes within the boundaries of the Garden, each at a different elevation above the present level of the Bronx River. The lower two are located in the hemlock grove and the highest one in the western border of the herbaceous plantation.

* Trans. N. Y. Acad. Sci. **16**: 18 24. 1896. Bull. N. Y. Bot. Gard. **1**[2]: 78–85. 1897.



Pot-hole in hemlock grove.

Pot-hole near herbaceous grounds.

Plate CXXII represents the lowest one, the bottom of which is about twenty-eight feet above the river. The side facing the river was eroded or has fallen away, leaving the interior exposed from top to bottom. Its place of beginning is somewhat obscurely defined, but may be recognized by tracing the concavity upward to the top of the rock wall. Originally it must have been approximately twelve feet in depth, by four or five feet in width down to where it begins to taper to the bottom. The two-foot rule, standing at the righthand side of the hole, will serve for a scale of measurements.

Plate CXXIII represents the other one in the hemlock grove, located at a higher level than, and to the south of the one first described. The upper part only is exposed, to a maximum depth of about five feet. It is irregularly elliptical in cross section, approximating six by seven and a half feet, with the longer axis extending toward the river. The rim and sides are well rounded, and erosion of the exposed side fronting the river is plainly apparent. The depth is unknown, as it is filled to the level of the forest floor with rock and vegetable debris, on top of which is a large boulder and in which is rooted a living tree about four feet in circumference.

Plate CXXIV represents the one on the border of the herbaceous grounds. It is the smallest of the three, but is the best preserved. It measures approximately two feet in depth by two feet in width, with a small bowl-like depression just above the upper rim, which was probably the original beginning of the hole, before the eroding contents found final lodgment at the lower level.

If the facts in connection with these pot holes are analyzed and interpreted, they indicate in unmistakable terms the following sequence of events.—The stream which in Pre-Glacial times occupied the valley of the Bronx and flowed though the depression where the tracks of the Harlem branch of the New York Central & Hudson River Railroad are now located, was obstructed by ice or glacial debris and diverted to the eastward, where it found two outlets,—one through the narrow swale in which the morphological and herbaceous plantations are

located and another in the general direction of the present river gorge. Erosion then began, and evidently this proceeded more rapidly in the latter, and a constantly increasing volume of the stream was diverted to this lower level outlet. The flow of water through the other outlet constantly decreased, ceased entirely, and the depression became a cut-off or slough, which eventually was silted up and converted into a bog, and this now furnishes the fine, black soil for the plantations located there.

In the meantime the river was constantly cutting its now single channel deeper, and eroding the side walls. Pot-holes were formed in the rock of the river bed, at successively lower and lower levels. Many were, doubtless, subsequently obliterated as the river cut its way down and eroded its banks; but the two here described were left where they may yet be seen, with the river flowing far below.

ARTHUR HOLLICK.

A DESTRUCTIVE STORM

The most destructive storm in the history of the Garden occurred in the late afternoon of August 10, 1913. The day had been very warm with a maximum temperature of 97.5° accompanied by high humidity, culminated by a downpour of rain at 5:45 P.M., with wind for about ten minutes of very high velocity.

A report by the Superintendent of Grounds shows that the following trees were uprooted:

1 cedar in economic garden.

2 poplars in front of museum.

2 hickories, 1 ash, and 1 elm facing lake no. 1 north of museum.

1 buttonwood, 1 maple, and 1 hackberry in herbaceous grounds.

1 sassafras on college path.

4 oaks, 7 hickories, and 5 hemlocks in hemlock grove on west side of river.

1 oak east of Long Bridge.

2 lindens and 1 oak northeast of Long Bridge, near Japanese cherry collection.

1 ash and 1 elm on the eastern boundary near propagating houses.

1 maple near lake no. 2.

3 oaks, 1 hemlock, 1 sassafras, and 1 birch in grove northeast of Lorillard Mansion.

2 sassafras on driveway to propagating houses.

Many branches were broken from other trees, and several thousand visitors were drenched and badly frightened. Most fortunately, there were no casualties. Almost all the laborers were engaged for ten days in clearing away the wreckage which blocked driveways and paths at several points.

N. L. BRITTON,
Director-in-Chief.

THE SEPTEMBER FLOWER EXHIBITION

An exhibition of plants and flowers was held in the Museum building on the sixth and seventh, Saturday and Sunday, by The Horticultural Society of New York, in coöperation with the Garden. The prizes offered were for cut blooms of gladioli and montbretias. The gladioli were especially admired, the excellent collection of Mr. T. A. Havemeyer attracting great attention. There were many beautiful things in this exhibit. The following are those who won prizes, which were offered by the New York Botanical Garden:

A large display of gladioli gave the first prize, in the open-to-all class, for a collection, to Mr. John Lewis Childs, who also won first prizes for twelve varieties, three spikes of each; a white variety, twenty-five spikes; a pink variety, twenty-five spikes; a collection of cut blooms of montbretias. In the class for non-commercial exhibits, a collection of gladioli gave the first prize to Mr. T. A. Havemeyer, A. Lahodny, gardener; this has already been alluded to. He also took first prize in the non-commercial class for a white variety, six spikes, with Europa; and for a pink variety, with Panama. The flowers of this latter were superb.

Special prizes were awarded as follows: Wm. C. Muschenheim, A. C. Wall, gardener, for a miscellaneous collection of flowers, cash prize, and for a display of Chrysanthemum Sunflowers, special mention; Chas. H. Rice, cash prize, for a collection of dahlias; Mrs. F. A. Constable, Jas. Stuart, gardener, for a vase of *Heliopsis scabra major*, cash prize and certificate of merit; Jas. A. Macdonald, R. Hughes, gardener, cash prize, for two pots of coleus.

GEORGE V. NASH.

AUTUMN LECTURES

Lectures will be delivered in the Lecture Hall of the Museum Building of the Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

Oct. 4. "The Nature and Classification of Vegetable Foods," by Dr. H. H. Rusby.

Oct. 11. "The Digestibility of Vegetable Foods," by Prof. W. J. Gies.

Oct. 18. "Cereal Foods," by Mr. G. V. Nash.

Oct. 25. "Starchy and Sugary Foods," by Dr. R. A. Harper.

Nov. 1. "Vegetable Foods of the American Indians," by Dr. A. B. Stout.

Nov. 8. "Tropical Vegetable Foods," by Dr. H. H. Rusby.

Nov. 15. "Edible Fungi," by Dr. W. A. Murrill.

Nov. 22. "The Selection and Preparation of Vegetable Foods," by _____.

Nov. 29. "The Uses and Characteristics of Palms," by Dr. N. L. Britton.

The lectures, which occupy an hour, will be illustrated by lantern slides and otherwise. Doors closed at 4:00; late comers admitted at 4:15.

The Museum Building is reached by the Harlem Division of the New York Central and Hudson River Railroad to Botanical Garden Station, by trolley cars to Bedford Park, or by the Third Avenue Elevated Railway to Botanical Garden, Bronx Park.

Visitors coming by the Subway change to the Elevated Railway at 149th Street and Third Avenue. Those coming by the New York, Westchester and Boston Railway change at 180th Street for crosstown trolley, transferring north at Third Avenue.

NOTES, NEWS AND COMMENT

Dr. Ira Dietrich Cardiff, a student at the Garden from 1904 to 1906, who has recently been head professor in Washington State College and plant physiologist of the Washington State Agricultural Experiment Station, has been appointed director of that Experiment Station, retaining his position as head of the department of botany in the College.

Four handbooks on the flora of Florida have recently been published by Dr. John K. Small, head curator of the museums and herbarium, completing his investigations on the plants of that state in so far as collections made up to the present time are concerned.

1. The "Flora of Miami" contains descriptions of the flowering plants growing naturally in the everglade and limestone region of southern peninsular Florida.

2. The "Florida Trees" contains descriptions of the native and naturalized trees of the State of Florida, including 366 species.

3. "Flora of the Florida Keys," containing descriptions of the flowering plants of the islands of the Florida reef from Virginia Key on the north to the Tortugas on the southwest.

4. "Shrubs of Florida," containing descriptions of the native and naturalized shrubs of the state.

All four of the handbooks contain analytical keys and citations of the geographic distribution of the species. There is much original information in all these volumes. The collections on which the studies were based are nearly all preserved in the herbarium of the Garden.

The second part of Volume 15 of North American Flora, containing descriptions of the genera and species of the moss families

Dicranaceae and Leucobryaceae, written by Mr. Robert S. Williams, administrative assistant, was published August 8, 1913, making nineteen parts of the work now published, distributed among eight volumes. The next part to be issued will be the fifth and final part of Volume 22, completing the order Rosales.

Mr. George V. Nash, head gardener, attended the Fifteenth Annual Convention of the American Association of Park Superintendents, held at Denver, Colo., August 25 to 27. Park superintendents and others interested in park development and its closely related subject of public play grounds were present from many parts of the United States and Canada. The headquarters were at the Brown Palace Hotel, where all the meetings were held. A welcome to the convention was extended by the mayor of the city.

The Park Department acted as hosts, and their entertainment was lavish. Facilities were afforded for visiting the park system. The first day a thirty-five mile automobile ride over a part of the park system was a feature, terminating at Inspiration Point, from which place a magnificent view of the Rockies is obtained. A drive on the second day gave further opportunity for an inspection of the parks. It was reserved, however, for the third day for the greatest treat of all, a drive of sixty-five miles in automobiles through the new mountain park system which is now being installed. A new road connecting this system with the city was officially opened that day by the Park Department, twenty-eight automobiles conveying the members of the convention and their friends over a magnificent piece of scenic roadway. This drive included a trout fry, as a dinner inducement, on Lookout Mt., at an elevation of over 7,000 feet, and a wonderful view of the Rocky Mts. from Genesee Mt., at an elevation of about 8,000 feet. The return was made through Bear Creek Cañon, a splendid ride with kaleidoscopic changes. This mountain park system of Denver comprises a chain of parks of various sizes located upon ground purchased by the city. It is a broad-gauge development and worthy of the progressive west. The ride was greatly enjoyed by all, giving to many their first

view of the wonderful Rockies. It must be uplifting to live in the presence of these majestic peaks, and it is no wonder that Denver wants to do big things with this inspiration always before her.

The next convention will be held at Newburgh, N. Y., the time to be designated later. The new president is Henry Richards, superintendent of parks of Chicago. The retiring president was J. B. Shea, superintendent of parks, of Boston.

Dr. W. A. Murrill, assistant director, returned September 3 from Europe, where he has been making a study of the types of American gill-fungi preserved in the larger herbaria.

Mr. Albert Le Roy Andrews, Ph.D., instructor in German at Cornell University, has been in residence at the Garden during August and September on a scholarship for the taxonomic study of the genus *Bryum*.

Dr. N. L. Britton, director-in-chief, Mrs. Britton and Mr. Stewardson Brown sailed for Bermuda on September 9, where they will spend three weeks in further studies of the flora of the Bermudas.

Mr. Maurice Picard, M.A., recently elected assistant professor of botany at Middlebury College, spent several days at the Garden during the past month collecting material for the cytological study of *Hibiscus*.

Miss Winifred J. Robinson, Ph.D., assistant professor of botany at Vassar College, has been acting dean of women at the University of Wisconsin during the 1913 summer session of the University. At the close of the session Dr. Robinson returned to New York and spent several weeks at the Garden in continuing her studies of tropical ferns and in work upon *Gingko biloba*, an apparently parthenogenetic form of which is growing upon the campus of Vassar College, Poughkeepsie, New York.

Meteorology for August.—The total precipitation for the month was 3.00 inches. Maximum temperatures for each week were

as follows: 95° on the 3d, *97.5° on the 10th*, 95° on the 18th, and 86° on the 28th. The minimum temperatures were 56° on the 6th, 54° on the 12th, *52° on the 22d*, and 55° on the 28th.

ACCESSIONS

MUSEUMS AND HERBARIUM

100 specimens "Fungi Exotici Exsiccati" fascicles 1 and 2. (Distributed by H. & P. Sydow.)

11 specimens of crude drugs. (Given by Dr. H. H. Rusby.)

7 specimens of *Trifolium* from the western United States. (Given by Dr. A. A. Heller.)

37 specimens of flowering plants from Asia. (By exchange with the Bureau of Plant Industry, Washington, D. C.)

21 specimens of cacti from North America. (By exchange with the United States National Museum.)

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JOURNAL

OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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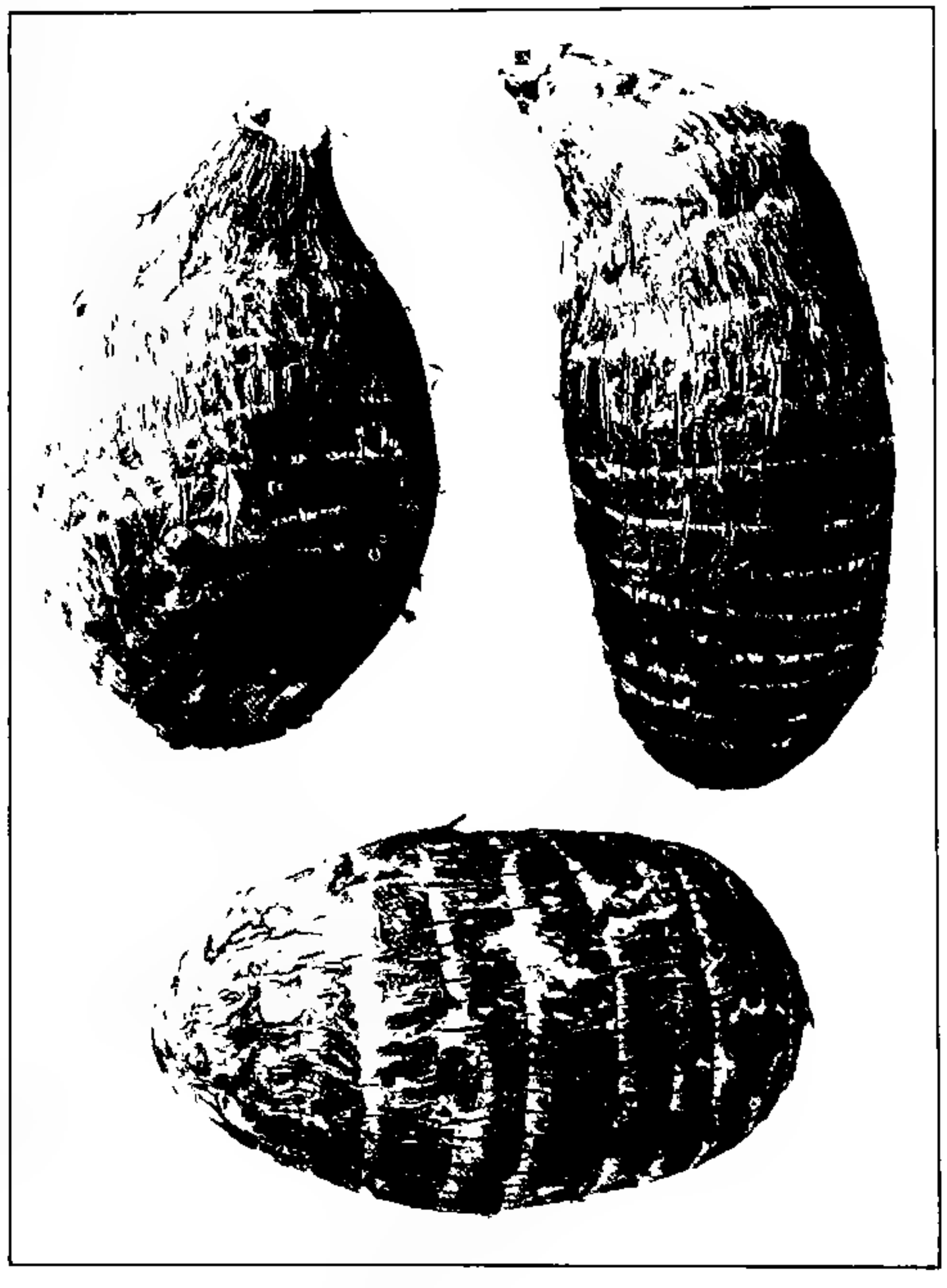
A typical dasheen plant



Tubers of the dasheen, about $\frac{1}{2}$ natural size.

JOURNAL

OF

The New York Botanical Garden

VOL. XIV October, 1913 No. 166

THE DASHEEN

WITH PLATE CXXV

The tuberous aroid now known in the United States and parts of the West Indies as the dasheen belongs to a section of the Araceae containing a number of plants which for thousands of years have been of very great importance as sources of food in tropical countries. The taro, of the islands of the Pacific and of southeastern Asia, is the most widely known of these plants, and to this the dasheen is more nearly related than to any other; in fact, it would probably be correct to say that the dasheen is a kind of taro. Both belong unquestionably to the genus *Colocasia*, but because of the diversity of forms of each, and the comparatively small amount of botanical study that has been given to this genus, the writer refrains from attempting to use specific names.

The yautia, of which there are several species and varieties, belonging to the genus *Xanthosoma*, constitutes another section of this group of valuable plants.

This genus is believed by botanists to be of strictly American origin though a number of varieties are now to be found in cultivation in many other parts of the tropical world. For various reasons, including the greater length of season required by the yautia to mature, it has not been found so well adapted as the dasheen for culture and use in the southern states. Other genera also furnish food plants, but of less importance.

[JOURNAL for September, 1913 (14: 157–166), was issued October 7, 1913.]

Various names, as for example, "malanga," "tanier," "tannia," "taya," "coco" and "eddo" are also applied to the dasheen in different localities in the West Indies and other parts of tropical America. These names are likewise frequently used for the yautia and some of the other edible aroids of this class. For instance, in Dutch Guiana, "taya" is the general name by which dasheens, yautias and alocasias are known, there being for each particular variety a special name prefixed to the word "taya."

The name "dasheen" is known to be of West Indian origin and there appears to be unanimity of opinion among those who have inquired into the subject, that it arose through a corruption of an expression "da Chine" or "du Chine," in one of the French dialects, signifying "from China." Mr. O. W. Barrett, formerly of the Porto Rico Agricultural Experiment Station, who, with Mr. David Fairchild, of the United States Department of Agriculture at Washington, was a pioneer in the introduction of the edible aroids into this country, offered this explanation in a letter to the writer in 1911. This was confirmed later in a report by Mr. F. T. F. Dumont, then American consul at Guadeloupe, French West Indies, and still more recently by Mr. W. G. Freeman, assistant director and government botanist of the Department of Agriculture of Trinidad.

With a crop plant of so great merit near our doors it seems odd that the introduction of the dasheen was not accomplished many years ago. True, the tubers have long been on the markets in a few southern cities where there is a considerable West Indian population to demand the vegetable, and on our South Atlantic coast, a certain variety of taro, under the name "tanyah," has for years grown in a semi-wild state, but in the former case it is practically the foreign population only that has availed itself of the opportunity, and in the latter, the growing of the crop has never reached commercial proportions, even locally. It is perhaps, however, largely the indiscriminate importation of tubers, with little regard for variety, or quality, or manner of packing and offering for sale, that has prevented the acceptance of this class of food products by people who should welcome them.

As previously stated, there are many varieties of dasheens,

and there are almost as many degrees of quality. One of the varieties brought by Mr. Barrett from Trinidad, by way of the Porto Rico Experiment Station, in 1905, has proved to be the best one in all the large collection that was afterward assembled. It is being disseminated by the Department of Agriculture under the name of the Trinidad dasheen. The dasheen is not believed to be indigenous to Trinidad nor, in fact, to the Western Hemisphere. In the opinion of botanists the evidence seems to indicate that the dasheen as well as other members of the genus *Colocasia* originated in the Old World, possibly in the Polynesian Islands.

There is no doubt that numerous varieties were brought to the New World from China, by Chinese coolies and others. However, since none of those secured from China and elsewhere more recently, by the United States Department of Agriculture, possess all the characters of the Trinidad variety mentioned, it seems at least possible that it has undergone some modification since its introduction from China. Indeed, there are reasons for believing that changes for the better have taken place even since it was brought to this country.

The Trinidad dasheen, as at present grown in the south, comprises several strains, which, while practically identical in appearance, differ materially in quality. Unfortunately these differences are not apparent until the dasheen is cooked, so that one can never determine the quality beforehand. It is hoped, however, that by selection, strains of uniform quality can be developed. Work to this end is already under way.

The tuberous growth in a hill of dasheens consists of one or two nearly spherical corms, weighing, on an average, one and a half to two pounds each, around which are clustered from fifteen to fifty cormels, called "tubers" in common usage. The tubers vary greatly in shape and size. In weight they range from one ounce or less to twelve ounces. The corms in rare instances have attained a weight of nearly five pounds. Both corms and tubers are edible and of practically equal quality.

In flavor, the best dasheens are much like a firm, fine-grained potato, with an added flavor of chestnuts. They are drier and consequently need more butter than potatoes, when served baked

or boiled. Few persons have to acquire the taste for them when they are properly cooked and served. Children become particularly fond of them, usually preferring them to potatoes. The subject of the preparation of this vegetable is treated rather fully in a paper on the dasheen published as a part of circular No. 127, Bureau of Plant Industry, U. S. Department of Agriculture, which may be obtained by addressing the Department. It may be stated here, however, that the modes of preparation are, with slight modification, the same as for the potato. The Trinidad dasheen requires no longer cooking than does the potato, as the corms and tubers are free from the acrid principle which in such varieties as the tanyah of the South Atlantic states, necessitates very long cooking.

The nutrient elements in the dasheen are in about the same relative proportions as in the Irish potato but as the former contains much less water, the percentages of protein and other elements are approximately one half greater than in the potato. Wherever dasheens or other aroids are grown they are considered to be much more easily digested than potatoes and most other starchy foods. In the Hawaiian Islands, taro in the form of poi is prescribed by physicians regularly for their patients when there is any disturbance of the digestive system.

Aside from its use as a vegetable the dasheen is dried and ground into flour. A very satisfactory flour has been made from dasheens grown in Florida, and in the opinion of some the use of the flour will ultimately greatly exceed that of the fresh tuber. The tubers have also been successfully shredded, or sliced, and dried for later use.

Another product derived from the dasheen is the blanched shoots, secured from the large corms by forcing them in a darkened chamber. This was done on a small scale at the greenhouses of the Department of Agriculture at Washington, and later on a much larger scale at the Battle Creek Sanitarium, Battle Creek, Michigan. The shoots are very tender and have a delicate flavor, suggestive of mushrooms.

The young leaves and stems of dasheen plants growing in the field are also used for food, the former, when properly cooked,

making a dish not inferior to the best spinach. A special method of cooking is required to destroy the acridity in the leaves and stems.

The dasheen, being essentially a tropical plant, requires a long, warm season. Six to eight months without frost is needed. It is a moisture-loving plant, but it thrives well in rich, porous soil that is only a little too moist for ordinary crops. While some of the related plants are grown regularly under irrigation in other parts of the world the dasheen has not yet been tested in this way. This method of culture is now under investigation.

As an upland crop the dasheen has produced more than 400 bushels to the acre in the southern states, where soil conditions are suitable. The yield of course falls correspondingly when the requisite conditions are not supplied.

The value of this crop for the south lies principally in the fact that it matures in the autumn. The main potato crop is grown in the spring and the small grower is obliged to dispose of it within a short time in order to avoid loss through deterioration and decay due to hot weather. Later, he must buy northern grown potatoes at a high price. Dasheens, when properly cured and stored, keep well. In the far south, where the ground does not freeze, they can be left in the ground and harvested as wanted during the winter and early spring.

Dasheens for propagating purposes were distributed in the spring of 1913 to more than a thousand persons, principally in the South Atlantic and Gulf States and in Southern California. Some of these coöperators have attained a marked degree of success, though with few exceptions the areas grown were very small. As the larger successful growers are already making marketing arrangements with fruiterers and restauranters in New York and other cities, both north and south, it is probable that this season the dasheen will make its debut as a regular commercial product. For the present, on account of scarcity if for no other reason, the cost will doubtless be considerably greater than for potatoes, and in view of the higher food value of the dasheen, the price should probably normally remain somewhat higher.

ROBERT A. YOUNG.

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE.

GARDENS OF BERMUDA

The climate of Bermuda permits the luxuriant growth and profuse flowering of a great variety of plants from warm temperate and subtropical lands. In the older gardens, many rare specimen trees and shrubs of botanical and horticultural interest exist, and in the newer gardens, many other species have been established. A visit during three weeks of September, with Mrs. Britton and Mr. Stewardson Brown, curator of botany in the Academy of Natural Sciences of Philadelphia, in continuation of previous Bermudian studies, was mainly occupied in studies of garden plants, in coöperation with Mr. E. J. Wortley, the newly appointed director of agriculture.

Chief and foremost of the floral features of the islands at this time of the year is the oleander, native of Asia Minor, for which Bermuda is famous in song and story. It is more of a hedge plant than actually in gardens and has spread over the hillsides, strikingly beautiful shrubs often growing in wild surroundings; the flowers of all shades from white to rose and dark red, and double kinds are common. The Chinese hibiscus rivals the oleander, if not in abundance, certainly in floral colors, from white (which is rare) through pink to crimson, growing in great luxuriance. *Tecomaria*, of South Africa, a shrub relative of our trumpet-creeper, with pinnate leaves and clusters of scarlet flowers, is freely planted as a hedge. The pigeon-berry, a West Indian shrub with small leaves and long nodding racemes of small bluish flowers, is a graceful and almost universal ornament. The "queen-of-shrubs," better known to us under the name of crape myrtle, native of tropical Asia, is abundant in shrubberies. Walls are covered by the Japanese honeysuckle, its fragrant flowers first white, then yellow. The large periwinkle, white or deep pink, and the blue plumbago, from the Cape of Good Hope, are abundant and beautiful in borders.

There are four small public gardens in Bermuda. The park at Hamilton is openly planted with trees and surrounded by a border of trees and shrubs, including some fine specimens. The old estate Parla-Ville, also in Hamilton, where the building containing the collections of the Bermuda Natural History Associ-

ation is located, contains many fine old trees, among them a grove of St. John's bread (*Ceratonia siliqua*), native of the Mediterranean region, Litchis, of eastern Asia, and avocado pears, Central American in origin; the latter may, however, be seen in larger specimens elsewhere. The public garden at St. Georges contains a fine and varied collection. It is a level, openly planted lawn enclosed by a nearly continuous mixed border planted against a wall which is covered by many kinds of flowering vines from the tropics of the Old World and the New. The centerpiece is a large tree of the sand-box, or monkey puzzle as it is here called (*Hura crepitans*), of tropical America, bearing fruits which explode noisily when mature; two elegant and perfect screw-pines at once attract the attention of visitors. A group of very old and tall date palms is a feature of one end of the garden; the date is commonly planted throughout the islands for ornament and interest, but it does not bear very good fruit, though individual trees fruit quite abundantly. Many herbaceous plants are grown in the front of this highly interesting border. Our inspection of this garden was under the guidance of Mr. R. R. Swainson, who has it in charge.

The gardens of the Agricultural Station in Paget contain the greatest number of species to be seen in any one Bermuda establishment, brought together during the last ten or twelve years. The area of soil available for planting here is too limited and the soil mostly of insufficient depth to permit either agricultural experimentation or horticultural work to be carried on in a very effective way. Many plants rare in cultivation may here be seen, among them a fine young tree of the West Indian *Catalpa longissima*, flowering at the time of our visit; the cocaine tree of Peru, also in flower; camphor trees, not often grown outside of the Old World tropics; the mountain pride of Jamaica, a tree which dies soon after flowering; and a large variety of interesting shrubs and herbaceous perennials.

The grounds of Government House at Mt. Langton, where we were hospitably received and guided by His Excellency General Sir George M. Bullock, governor of Bermuda, are open to visitors at times. The collections contain many specimens of

interest and beauty. A bay rum tree, West Indian, is one of the most elegant individuals of its kind to be seen anywhere, two silk-cotton trees, also West Indian, are among the largest to be seen outside of their native lands, and a jungle of the Asiatic bamboo, giant of the grasses, is a novelty to visitors from the North; the bamboo is not uncommonly seen elsewhere in the islands; a pair of old gru-gru palms (*Acrocomia*), West Indian, are about as tall as any in Bermuda. The driveway approach through a deep rock cutting with vertical walls covered by vines, the road planted on each side with flowering shrubs, is a very attractive feature. The grounds of Admiralty House at Clarence Hill, open one day a week, are attractive, but contain at present little of botanical interest, exceptional being a fine tree of *Torrubia*, perhaps the only one in Bermuda. Several of the churchyards contain trees and shrubs of interest and beauty. At the Devonshire church, an ancient specimen of Bermuda cedar, a famous tree, is carefully preserved.

Among trees commonly planted in both public and private gardens, mention may be made of *Albizzia Lebbeck*, of the Old World tropics, here known as "black ebony," a widely spreading tree with compound leaves, round heads of small flowers and large thin pods; the royal poinciana of Madagascar, one of the most elegant of trees when in bloom, its orange and scarlet clustered flowers followed by long woody pods; the white cedar of the West Indies, with digitate leaves and beautiful light pink flowers; galba, also West Indian, a tall tree with lustrous thick simple leaves; the sword-flower (*Erythrina*), with leaves composed of three broad leaflets, the coral-red flowers in clusters; pride of India (*Melia*), one of the most abundant of all; the oriental plane; *Lonchocarpus violaceus*, of the West Indies, with racemes of violet-blue flowers; tamarinds, East Indian, some of great size and fruiting abundantly; avocado pears, already referred to; mangos, Asiatic, which for the most part fruit sparingly; mahoe, tropical American, with orbicular leaves and large yellowish to red flowers, here erroneously called tulip-tree; sour sops and sugar apples and the Surinam cherry, all from tropical America; and of kinds well known to American visitors,

the North American locust and the ailanthus. Climate and soil are well adapted to other fruit trees of warm temperate and tropical climes, but the present prevalence of a destructive fruit fly and of scale insects prevents the production of good fruit; otherwise oranges, lemons, peaches, apricots, loquats and others could be produced abundantly; trees of all these are to be seen in plantations.

Many palms are grown for ornament and interest, among them the date and the gru-gru, already mentioned; tall royal and cabbage palms from the West Indies; the Bourbon palm, African, with broad fan-shaped leaves and spiny leaf stalks; rattan palms of China, which form dense thickets; the betel-nut (*Areca*), Asiatic; and the native endemic palmetto is widely planted. Cactuses are represented by a number of kinds from Mexico and the West Indies; the climbing ones with large flowers opening at night are of two kinds, the one (*Hylocereus*) with three-angled stems, the other (*Selenicereus*) with round fluted stems; both are commonly grown on walls and trees. Several species of prickly pears may be seen; there is a splendid specimen of the velvety one (*Opuntia tomentosa*) on a roadside bank near St. Georges. The wild native yellow-spined prickly pear grows abundantly in rocky places. The cochineal cactus (*Nopalea*), nearly spineless, is frequently planted, as is the bushy leafy *Pereskia*, with clusters of pink flowers and long axillary spines. The Turk's-head cactus is occasionally planted on posts and walls. At least three tall fleshy spurges (*Euphorbia*), natives of Africa, full of milky sap, are grown for interest and sometimes erroneously called cacti.

The private grounds and gardens of Bermuda contain many kinds of plants not to be seen in the public collections. It was our privilege to be admitted to several, and many notes were made of unusual species. A number of these were quite strange to us and their botanical affinities will be further studied. Many specimens were collected to illustrate the occurrence or cultivation of particular plants, for preservation at the New York Botanical Garden, the Academy of Natural Sciences of Philadelphia and the Bermuda Agricultural Station. A complete

knowledge of all plants growing in Bermuda gardens could be obtained only by devoting much time to the investigation. Sufficient has been said to give an idea of the variety of plant life to be seen in this limited area of about 20 square miles, and to indicate the great possibilities there of a botanical garden.

N. L. BRITTON

VISIT OF PROFESSOR ADOLF ENGLER

Returning from a botanical tour around the world by way of Africa, the Orient, and the Pacific coast, Professor Adolf Engler, director of the famous botanical garden at Berlin and one of the leading systematic botanists in the world, spent a few days in New York before he sailed for Germany.

Friday, October 17, was devoted by Professor Engler to an inspection of the New York Botanical Garden. He arrived at an early hour and spent the forenoon with the curators in the Museum building examining the herbarium and museum collections; and the afternoon on the grounds and in the conservatories and propagating houses.

A complimentary dinner was arranged by Dr. Britton and Dr. Harper for the evening, at which about twenty-five of the local botanists were guests. Professor Engler spoke of the very cordial welcome he had received everywhere in this country and of the remarkable plants he had seen, both in the far West and in the eastern United States. He seemed most impressed with the giant cactus, *Carnegiea gigantea*, of the southwestern deserts, and with the big trees of California.

Professor Engler carries with him to Berlin valuable notes on the American flora, as well as the good wishes of every American botanist who was fortunate enough to meet him.

W. A. MURRILL

AUTUMN MEETING OF THE NEW YORK STATE FORESTRY ASSOCIATION

The New York State Forestry Association was organized last January, in Syracuse. At a meeting of the executive committee held at the New York Botanical Garden in the spring, Dr. N. L. Britton, president of the Association, extended an invitation to the committee to arrange for a fall meeting at the Garden, with the idea of stimulating interest in the work in and about New York City and to consider several rather vital problems connected with the development of the Association.

This fall meeting was held October 17, in the lecture hall of the Museum building. The meeting opened at 10 A. M. with Dr. Britton in the chair, and Dean Baker, of Syracuse University, at the secretary's desk. About an hour was devoted to the business of the Association. The chief problem discussed at the morning session was "A State-wide Survey of Forest Resources," opened by Professor F. F. Moon, of the New York State College of Forestry. At the close of the discussion, there was no doubt in the mind of any one present that this survey was highly desirable and should be undertaken as soon as possible.

Luncheon was served at one o'clock, in a room adjoining the lecture hall, the tables being decorated with various kinds of autumn leaves. After luncheon, a brief inspection was made of the collections in the museum building under the guidance of the curators, and the members assembled shortly after two o'clock for the afternoon session. At this session, Professor Walter Mulford, of the New York State College of Agriculture, opened the subject of "The Possibilities of Woodlot Forestry," which was freely discussed from the standpoint of the farmer. It was thought that a state-wide campaign of education along this line would be highly beneficial, and methods of getting the proper information to the farmers were suggested.

The afternoon session adjourned rather early and the members were escorted through the grounds and conservatories of the Garden by several members of the staff. Special attention was devoted to the hemlock grove, on the banks of the Bronx River,

to the arboretum and to the collection of hawthorns in the fruticetum, loaded with attractive, highly colored fruit.

W. A. MURRILL

NOTES, NEWS AND COMMENT

A recent visitor to the Garden was M. Armand Renier, of the University of Liege, and director of the Geological Survey of Belgium, who spent several days examining the type specimens of carboniferous fossil plants included in the collections from Ohio described by Dr. J. S. Newberry.

Mr. Frank Shipley Collins, author of "The Green Algae of North America" and of numerous other papers relating to the North American algae, was a visitor at the Garden on September 8.

Mr. Edward Lyman Morris, editor of the *Bulletin of the Torrey Botanical Club*, and since 1907 curator of natural science in the Museum of the Brooklyn Institute, died at his home in Brooklyn September 14 from accidental asphyxiation by illuminating gas. Mr. Morris was born in Monson, Massachusetts, October 23, 1870, and was a graduate of Amherst College in the class of 1891. From 1893 to 1895 he was a laboratory assistant and instructor in biology in Amherst College and from 1895 to 1907 was a teacher in the high schools of Washington, D. C., being head of the department of biology from 1900 to 1907. While a resident of Washington, he acted at various times as expert and field assistant for the United States National Herbarium, the United States Department of Agriculture, and the United States Fish Commission. Following the resignation of Dr. Frederick A. Lucas in June, 1911, to become director of the American Museum of Natural History, Mr. Morris was for more than a year the acting director of the Museum of the Brooklyn Institute. Mr. Morris was engaged in a special taxonomic study of the Plantaginaceae of North and South America. The cutting short of a career of substantial attainments and unusual promise will be widely and sincerely regretted.

The October meeting of the New York Library Club was held at the Garden on the afternoon of Thursday, October 9, with an attendance of 160. The special subject of the meeting was "Education Outside of Books." Illustrated addresses were delivered by Dr. N. L. Britton, on the educational work of the New York Botanical Garden, and by Mr. Raymond L. Ditmars, on the work of the Zoölogical Society and its park.

Mr. Ernest Dunbar Clark, Ph.D., Columbia University, '10, an investigator at the Garden almost continuously since 1908, has recently resigned the position of instructor in chemistry in the Cornell Medical School to accept the position of soil biochemist in the United States Department of Agriculture, Bureau of Chemistry, Washington, D. C.

Dr. Frederick H. Blodgett, who was student and aid at the Garden, 1900–'01, is now plant pathologist and physiologist of the Texas Agricultural Experiment Stations, with headquarters at College Station, Texas.

Dr. T. Wayland Vaughan, of the United States Geological Survey, was a visitor at the Garden September 20. The fossil algae obtained by Dr. Vaughan and Dr. D. F. MacDonald in their geological survey of the Panama Canal Zone are being studied by Dr. Marshall A. Howe, of the Garden staff.

Several changes have occurred in the botanical department of Columbia University beginning with the present school year. Dr. Chester A. Darling, formerly an instructor, has resigned this position to become professor of biology in Allegheny College, Meadville, Pennsylvania, and Mr. Fred D. Fromme, an assistant, has accepted a position in the botanical department at Purdue University, Lafayette, Indiana. Recent additions to the botanical staff at Columbia University are Mr. Allen C. Fraser, B.A. Cornell '13, who was assistant in plant breeding at the New York Botanical Garden during the past summer, and Mr. F. V. Rand, M.S. University of Vermont '11, for the

past five years assistant pathologist in the Bureau of Plant Industry, United States Department of Agriculture.

In the August number of the *Botanical Gazette*, Mr. James Ellis Gow published the results of investigation on the morphology of the Aeroids, based largely on studies of material supplied by the New York Botanical Garden. Eleven species belonging to ten different genera were investigated and the knowledge of the morphology of this family considerably extended.

Miss Bertha E. Shapleigh, of the Teachers College, Columbia University, has been secured to deliver the public lecture at the Garden on the afternoon of Saturday, November 22, entitled "The Selection and Preparation of Vegetable Foods."

Meteorology for September.—The total precipitation for the month was 2.91 inches. Maximum temperatures for each week were as follows: *88° on the 4th*, and *on the 8th*, 79° on the 18th, and 78° on the 28th. The minimum temperatures were 60° on the 6th, 41° on the 15th, *39° on the 16th*, and 42° on the 26th.

ACCESSIONS

MUSEUMS AND HERBARIUM

3 specimens of mosses from Porto Rico. (By exchange with Mr. J. R. Johnston.)

14 photographs of cacti from North America. (By exchange with the United States National Museum.)

1 specimen of moss from Colombia. (By exchange with Brother Leon.)

9 photographs of plants. (By exchange with the Field Museum of Natural History.)

116 specimens of fungi from Porto Rico. (By exchange with Mr. J. R Johnston.)

27 specimens from the Black Hills, South Dakota. (By exchange with Mr. W. P. Carr.)

152 specimens of flowering plants from North Carolina, Wyoming, Utah, and Oregon. (By exchange with the New York State Museum, Albany, New York,)

150 specimens "Mycotheca Italica," centuries 17 and 18 (in part). Distributed by Dr. D. Saccardo.)

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OF

The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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View of a portion of the aroid group in house 4, range 1. *Philodendron Imbe* to left; *Monstera deliciosa* in background; and *Anthurium scandens* in foreground to left.

JOURNAL

OF

The New York Botanical Garden

VOL. XIV November, 1913 No. 167

THE AROID COLLECTION

With Plates CXXVI and CXXVII

The arum family, known to botanists as the Araceae, is widely distributed throughout the tropical world, over ninety per cent. of the species being found in that zone. They inhabit, in great part, the dense shade of the forests where the atmosphere is hot and charged with moisture. The remaining species are confined to the temperate and warm temperate regions, the cold zones being entirely devoid of them. There are only seven or eight genera in the United States, representing about fifteen species. The Old World is much richer in endemic forms, both genera and species, than the New, especially the Malayan region and tropical Africa. In the New World the endemic forms are found largely in the tropical Andean region. The family comprises about 110 genera and perhaps 1,000 species.

There are few genera common to both the Old World and the New, *Homalomena*, *Cyrtosperma*, *Acorus*, *Spathyema*, *Calla*, *Arisaema*, *Pistia*, and *Spathiphyllum* being examples of a common distribution. Such genera, common in cultivation, as *Pothos*, *Amorphophallus*, *Schismatoglottis*, *Aglaonema*, *Alocasia*, *Colocasia*, *Sauromatum*, *Zantedeschia*, *Arum*, and *Dracunculus* are peculiar to the Old World; while *Anthurium*, *Monstera*, *Dracontium*, *Philodendron*, *Dieffenbachia*, *Caladium*, *Xanthosoma*, *Orontium*, and *Peltandra* are of the New World only.

In habit these plants are extremely variable. The modest

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little jack-in-the-pulpit of our own woodlands, and the large vigorous vines which make the tropical forests sometimes all but impassable, illustrate the extremes in this respect. Some of them have corms, but the greater part have fleshy rhizomes or stems, some of the latter being much elongated, the plants climbing up tall trees. The inflorescence is composed of two parts, the spathe and the spadix. The former organ, represented in the jack-in-the-pulpit by the "pulpit" with the overhanging top, is sometimes very small, while in other cases it is very large and showy. This is no part of the flower proper, however, and is really a large bract at the base of the flower-cluster. The spadix is made up of an axis, often very fleshy, upon which are arranged the flowers, which are either perfect, that is, with stamens and pistils, with or without a perianth, or unisexual, the stamens and pistils borne in separate flowers on different parts of the same spadix. So that the so-called "flower" of this family is in reality an aggregate of many flowers. The fruit is usually a berry, often highly colored as in the jack-in-the-pulpit.

Many members of the family possess irritant properties. Anyone who has tasted the corms of our own jack-in-the-pulpit, known also as the Indian turnip, can vouch for the irritating qualities of this particular species. Others of this genus *Arisaema* also have like irritant properties. The juice of the root of *Dieffenbachia Seguine*, of the West Indies, is acrid and poisonous. If a portion be chewed it causes a swelling of the tongue and loss of speech for a time. For this reason it has received the name of the dumb cane. Plants of this will be found in house no. 10. The acrid qualities are due partly to soluble substances and partly to the mechanical effects of needle-shaped crystals.

Comparatively few of the species furnish edible products. The most important food is furnished by the corm of *Colocasia esculenta*, known also as *C. antiquorum* and *Caladium esculentum*, originating in the tropical parts of the Old World. This is known under various common names such as taro, eddoes, scratch-coco, Egyptian arum, coco, and kopeh. This plant is wild over the

greater part of tropical India, but it is only the cultivated forms which are used for food, after boiling to destroy the acrid properties. Immense quantities of this food are also used in other parts of Asia, and other tropical countries, including the West Indies. This, and other similar foods, take the place largely in the tropics of the potato in temperate climes, their food value depending upon the starchy contents.

The dasheen, the subject of an article in the October number of this JOURNAL, is now attracting considerable attention as a food plant, it being largely used for this purpose in the West Indies and in portions of the United States. This is a species of *Colocasia*, but not definitely placed as yet.

The tropical American genus *Xanthosoma*, in several species and varieties, furnishes the yantia. The seeds and tubers of *Peltandra virginica*, the green water-arum, and the seeds of the skunk's-cabbage, *Spathyema foetida*, were used, after cooking, as food by the North American Indians. The Mexican bread-fruit is an aroid, known as *Monstera deliciosa*. It is a vigorous climber, well represented by two large plants in the group in house no. 4. The edible fruit of this vine is six to eight inches long and one to one and a half inches thick, and when ripe has a flavor and odor very similar to that of the pineapple.

The accompanying illustration, Plate CXXVI, is a view of a part of the collection of climbing aroids in house no. 4, range 1. Here are well shown the large vines of tropical forests which send down their long roots, plainly visible in the illustration, making a tangle through which one must cut his way. The cut-leaved plant in the rear is the Mexican bread-fruit, *Monstera deliciosa*. The large-leaved plant to the left is *Philodendron Imbe*, a native of Brazil; while the smaller plant in the foreground is *Anthurium scandens*, widely distributed in tropical America. Many of the species of *Philodendron* and other climbing species of other genera make superb decorative vines, as the examples here and in conservatories range 2 make quite evident.

One of the peculiar plants in this group, not in view in this illustration, is *Monstera latevaginata*, a native of tropical America. This was introduced into cultivation many years ago as *Pothos*

celatocaulis. This is an excellent example of variation in leaf-form in this family. The first or primary leaves are entire and lie flat against the object upon which the plant is climbing, in an imbricated manner, entirely concealing the stem. For this reason it was given the specific name of *celatocaulis*, which means "concealed stem." As the plant develops, the end of the stem finally produces leaves which are considerably cut, after the manner of those of *Monstera*. Although the flowers are unknown, Dr. Engler, the great authority on this family, has placed the plant in that genus, calling it *Monstera latevaginata*. It is interesting to trace the development in leaf-form from the ovate entire leaves closely appressed to the support, to the large lobed ones on the dependent stems. One can hardly believe these different forms belong to the same plant.

Another interesting plant here is Veitch's tail-flower, *Anthurium Veitchii*, a native of the mountains of Colombia. This is one of the most striking species of the genus, and this specimen is one of the largest of this species in cultivation. A short time ago it became necessary to retub it, the process requiring about nine barrels of peat. This operation is necessary only every few years. For a time it checks its growth, but it is now rapidly recovering and will soon attain its former proportions and beauty. The larger of the leaves are about four feet long and a foot wide, and are pendulous from long petioles. They are curiously marked with transverse somewhat curved elevations, producing a striking and decorative effect, much resembling some of the hammered-brass work.

Another imposing plant of this group is the giant philodendron, *Philodendron giganteum*, a native of tropical America. This large plant has been in the collection since 1901, when it was brought here from the island of St. Kitts by Dr. Britton.

An examination of the plants in this group in house no. 4 will make quite evident the great variety in leaf-form to be found in this large family of aroids.

While the larger plants are brought together in house no. 4, many others will be found on the center bench and under all the benches in house no. 10 of the same range. Here are placed those

View of a portion of the aroid collection in house 10, range 1. The plants on the bench corner are mainly tail-flowers, *Anthurium*. The plants on the side bench belong to the pine-apple family, *Bromeliaceae*.

of less vigorous climbing habit and those of a tufted or creeping manner of growth. A view of the plants here will impress one with the value of many of them as decorative foliage plants. Some of the finest of these are in the genus *Anthurium*, commonly known as tail-flowers, on account of the long tail-like spadix of many of the species. One of the best of these is *A. Andreanum*, decorative not only for its ample leaves, but for its brightly colored spathe also, ranging in color from the deepest blood-red to salmon, pink, and scarlet; there is also a form with a pure white spathe. *A. chelseiense* is a striking plant, a hybrid between *A. Andreanum* and *A. Veitchii*, with the spathe of the former and the leaves of the latter, somewhat modified. Another species, valuable for the coloration of its spathe, but smaller and more compact in growth than those already mentioned, is *A. Scherzerianum*, the spathe a deep red, and distinguished at once from the others by its peculiar coiled spadix.

Of especial value among the members of this genus, on account of their beautiful foliage, are the following, with the nerves bordered with a paler green: *A. Warocqueanum*, *A. magnificum*, *A. grande*, and particularly *A. crystallinum*, the finest of them all, with its large deep green velvety leaves. These are all from the Andean region in South America, the home of many endemic forms. Some of the species are extremely beautiful in fruit. One of these is the Costa Rican *A. Bakeri*, with its spikes of bright red berries. Perhaps the most striking of all in this respect is *A. tetragonum*, also of Costa Rica, with its immense pendulous cylindric spikes of bright red fully one foot long and two and a half inches thick; the individual berries are three quarters of an inch long, oblong-cylindric in shape.

Another genus containing many plants valuable for their decorative foliage is *Philodendron*, readily distinguished from *Anthurium* by its parallel venation, that of *Anthurium* being netted. Of rather compact tufted habit, therefore fine for pot plants, are the following: *P. Melinoni*, from French Guiana, a robust plant with magnificent foliage; *P. cannaefolium*, a Brazilian species; and *P. Glaziovii*, its narrowly oblong leaves differing from the others in the fine rugosity of the upper surface. One of

the finest vines in this genus is *P. gloriosum*, its general appearance, when in a congenial environment, expressed by its specific name. In great contrast to the others, which have entire leaves, is *P. tripinnatifidum*, a vigorous climbing plant with large much-divided leaves on long petioles. It is one of the most striking of foliage plants, but needs plenty of room for its proper development.

Most of the anthuriums and philodendrons need ample room for their best development, but there are many other members of the family which can be satisfactorily cultivated in much more restricted quarters. Among these are the members of the genus *Aglaonema*. The following are especially desirable: *A. costatum*, a small compact plant, the dark green leaves with a white midrib and white-spotted; *A. pictum*, leaves spotted with white; and *A. marantifolium*, the leaves a deep rich green, the lateral nerves bordered irregularly with gray-green. Another genus with several species which lend themselves to decorative purposes is *Homalomena*. One of the finest of these is *H. rubra*, the petioles a deep claret, very striking on this account. *H. argentea* has leaves gray-green, with a silvery sheen. The genus *Dieffenbachia* presents a number of forms striking in their foliage. *D. Barraquiniana* is especially attractive, with its ivory-white petioles; *D. Bausei*, the leaves yellowish-green, spotted with dark green and a few white spots; *D. maculata*, dark green foliage, spotted white; *D. costata*, the leaves a dark velvety green, the midrib whitish, the spots yellowish-green; and *D. imperialis*, the largest of them all, with immense leaves of a deep rich green, marked with large irregular spots of different shades of yellowish-green.

The genus *Schismatoglottis* offers some attractive species. *S. calyptrata trivittata* has narrowly oblong leaves with two longitudinal stripes of silvery white; in *S. neo-guineensis* the leaves are a rich green, marked with large irregular yellowish-green spots; *S. Roebelinii* has the leaves a silvery gray-green, with a row of irregular dark green spots forming a band down the center of the leaf. Another strikingly beautiful aroid is *Xanthosoma Lindeni*, the leaves halberd-shaped, the midrib and veins outlined with white.

The greater part of the aroids under cultivation in greenhouses require shaded conditions with plenty of moisture, both at the roots and in the atmosphere. An atmosphere which is hot and so loaded with moisture that it is uncomfortable for human beings is most favorable to many of the members of this family, and to such an environment they respond with a vigor and readiness which is a delight, providing us with some of our most beautiful foliage plants. A dry windy place is death to plants of this kind. This applies, of course, to evergreen species. Those with corms, such as *Caladium* and *Amorphophallus*, while requiring similar conditions in a growing state, have a period of rest during which the leaves die away. Such plants must be kept dormant for a time, the pots containing the corms being placed in a position where the water may be withheld and only sufficient applied to keep them from shriveling. Under the bench in a greenhouse, where the proper temperature may be maintained, is a suitable place.

A striking contrast is offered in this house no. 10 in the appearance of the aroids cultivated in pots, and hence under adverse and unnatural conditions, compared with the same species growing under the benches in the soil, their roots unhampered. Those in the latter position are much more vigorous, with the coloration of the foliage intensified. This is especially noticeable in the case of *Xanthosoma Lindeni* and *Homalomena argentea.*

There are other aroids in conservatory range 2. These are the larger climbers, and will be found on the walls of the tree-fern houses. Fine plants of *Monstera deliciosa*, *Philodendron Imbe*, and others are among these. Their rich green foliage adds much to the decorative features of these houses.

GEORGE V. NASH

ADDITIONAL DECORATIVE PLANTING IN THE CONSERVATORY COURT

As features to brighten the decorative flower beds in the spring, 30,750 bulbs have been planted this fall. Of these 17,400 have been placed in the various borders. They include tulips, daffodils,

narcissus, glory-of-the-snow, scilla, giant snowdrops, crocus, fall crocus, and English and Spanish irises.

The most extensive single planting has been of tulips in the beds in the court of conservatory range 1. The total number required was 13,350; of these 5,100 went into the central bed, 2,400 in each of the beds immediately paralleling this, 575 in each of the small beds paralleling these, and 1,150 in each of the beds placed transversely to the others. The kinds used belong to the early-flowering sorts. These will add a desirable decorative feature here in the early spring. Toward the end of May or early in June the bulbs will be removed, and the usual collections of desert plants installed in their place.

Evergreens have also been placed in this court. The elements of the architecture have been brought into the planting by using the columnar form of the American red cedar, thus representing the columns of the entrance, and the rounded form of the dome is duplicated in the dwarf knee-pines. The glaucous form of the cedar has been used, not only on account of its greater decorative value, but also because it is less liable to the attacks of red spider.

GEORGE V. NASH

WEATHER CONDITIONS DURING OCTOBER

Meteorology for October.—The total precipitation for the month was 8.89 inches. Maximum temperatures for each week were as follows: *79° on the 7th*, 78° on the 10th, 73° on the 17th, 65° on the 24th, and 72° on the 28th. The minimum temperatures for each week were as follows, 53° on the 5th, 43° on the 13th, 39½° on the 14th, *34° on the 23d*, and 37° on the 31st.

The most remarkable feature of the meteorology for the month was the exceptionally heavy rainfall, which was slightly more than one fourth the total (38.6 inches) for the entire year of 1912. The greater portion fell during three storms: one of 2.62 inches on October 1 and the night following; one of 1.37 inches on the 20th and the night preceding; and one of 3.70 inches rainfall during the twenty-four hours beginning about 5:00 P.M. of the 25th.

There was no killing frost during the month, a condition which is not exceptional at the New York Botanical Garden for the month of October. Records for the past eight years show that in only three years of this period has frost occurred earlier than October 29, and that in the years 1906 and 1912 there was no frost until in November.

During the month, inquiries have come to the Garden concerning the autumn pigmentation of leaves, the general impression being that the coloration had been less brilliant this season because of no early frosts. It would appear, however, from casual observations at the Garden that during the past October the various species produced leaves as brilliantly colored as can be found during any autumn. The full degree of coloration and the fall of leaves occurred in many species during the middle of the month without the direct influence of freezing temperatures. This is, however, not stating that the periodicity of the deciduous habit and the accompanying colorations are not directly concerned with seasonal changes in temperature influencing growth activities.

The autumn coloration and the leaf-fall of the various species seem, however, to extend over a longer period under such conditions of temperature and rainfall as existed during October. The changes appeared to occur more irregularly. An early freeze may very well hasten the changes and produce more brilliant general or mass effects both in single individuals and in groups of plants comprising different species.

Owing to the continued mild weather, the following shrubs were in bloom on November 8: *Cydonia japonica*, *Spiraea arguta*, *Spiraea Thunbergii*, and the three golden-bells, *Forsythia Fortunei*, *F. viridissima*, and *F. intermedia*. It is to be noted that these are among the plants which blossom early in the spring, so but little additional stimulus is required to start them into blossom.

A. B. STOUT

NOTES, NEWS AND COMMENT

Mr. Fred A. Miller, M.S., director of the botanical department of the Eli Lilly and Company, was in residence at the Garden during October on a scholarship grant for a taxonomic study of the genus *Digitalis*.

Dr. John K. Small, of the Garden staff, is spending the month of November in Florida in a study of the natural flora of the Everglades. From Miami as headquarters excursions will be made into the Everglades as far north as Lake Okeechobee.

Mr. C. G. Lloyd, of the Lloyd Library and Museum, Cincinnati, Ohio, spent part of October and November at the Garden examining the collection of polypores. Mr. Lloyd has recently been to Cuba and Florida collecting specimens of this group of fungi.

Mrs. Katharine Brandegee, a member of the California Academy of Sciences, has been visiting the larger herbaria of the East studying types of California plants, especially of *Lupinus* and *Gilia*, also some genera of the Onagraceae and Borraginaceae. She spent several weeks at the New York Botanical Garden after having visited Chicago and Cambridge, and is intending to spend some time in Philadelphia and Washington.

ACCESSIONS

MUSEUMS AND HERBARIUM

2 specimens of *Picea* from the Adirondack mountains, New York. (Given by Dr. Felipe Garcia Canizares.)

100 specimens of flowering plants from Bolivia. (Collected by Dr. Otto Bucktien.)

1 specimen of *Dichelyma falcata* from Round Mountain Lake, Maine. (Given by Miss Annie Lorenz.)

2 specimens of flowering plants from Rochester, New York. (Given by Miss Florence Beckwith.)

4 specimens of mosses from Island Heights, New Jersey. (Given by Mr. Percy Wilson.)

10 specimens of mosses from Sidney, British Columbia. (By exchange with Professor John Macoun.)

1 specimen of *Splachnum ampullaceum* from Maine. (By exchange with Miss Annie Lorenz.)

4 specimens of mosses from Tortola, West Indies. (Given by Mr. W. C. Fishlock.)

131 specimens of orchids from the Philippine Islands. (By exchange with Mr. Oakes Ames.)

400 specimens, "Algues marines du Finistere," vols. 1–3. (Distributed by H. M. and P. L. Crouan.)

53 specimens of flowering plants from North America and Asia. (Given by Miss Sarah H. Harlow.)

4 specimens of Hepaticae from Maine and New Hampshire. (By exchange with Miss Annie Lorenz.)

1 specimen of redwood from Wawona, California. (Given by Miss Mary A. Compton.)

1 specimen of Kus-kus grass from Barbados, West Indies. (Given by Miss Minerva Hart.)

1 specimen of *Hypholoma rigidus* from Pittsford, New York. (By exchange with Mr. Fred S. Boughton.)

39 specimens of fungi from Tyrol. (Collected by Giacoma Bresadola and Dr. W. A. Murrill.)

1 fungus from Colorado. (By exchange with Professor Elisworth Bethel.)

4 specimens of fungi from Saskatchewan and New York. (By exchange with Dr. L. H. Pennington.)

LIBRARY ACCESSIONS FROM MARCH 15 TO NOVEMBER 15, 1913

ADAMS, CHARLES CHRISTOPHER. *Guide to the study of animal ecology.* New York, 1913. (Given by Dr. N. L. Britton.)

BAILEY, FREDERICK MANSON. *Comprehensive catalogue of Queensland plants.* Brisbane, [1909].

BLAKESLEE, ALBERT FRANCIS, & JARVIS, CHESTER DEACON. *Trees in winter: their study, planting, care and identification.* New York, 1913. (Given by Dr. N. L. Britton.)

Boston metropolitan park report 1893, 1895–98. (Given by Dr. J. H. Barnhart.)

BOUDIER, ÉMILE. *Histoire et classification des Discomycètes d'Europe.* Paris, 1907.

BRITTON, NATHANIEL LORD, & BROWN, ADDISON. *An illustrated flora of the northern United States, Canada and the British possessions.* Ed. 2. 3 vols. New York, 1913. (Given by Dr. N. L. Britton.)

BROCKMANN-JEROSCH, HENRYK, & RÜBEL, EDUARD. *Die Einteilung der Pflanzengesellschaften nach ökologisch-physiognomischen Gesichtspunkten.* Leipzig, 1912.

BROWN, JOHN EDNIE. *Forest flora of South Australia.* 5 parts. [Adelaide, 1882.] (Given by Mrs. Van Hernert.)

CAMPBELL, DOUGLAS HOUGHTON. *Plant life and evolution.* New York, 1911. (Given by Dr. N. L. Britton.)

CHRISTENSEN, CARL. *Index filicum.* Hafniae, 1906. (Given by Miss Jean Broadhurst.)

iv Conférence internationale de génétique; Paris, 1911. Paris, 1913.

CORRENS, CARL ERICH, & GOLDSCHMIDT, RICHARD. *Die Vererbung und Bestimmung des Geschlechtes. Zwei Vorträge.* Berlin, 1913.

FERNOW, BERNHARD EDUARD, HOWE, CLIFTON DURANT & WHITE, J. H. *Forest conditions of Nova Scotia.* Ottawa, 1912. (Given by Dr. N. L. Britton.)

FOORD, JOHN. *The life and public services of Andrew Haswell Green.* Garden City, 1913. (Given by Dr. N. L. Britton.)

GOEBEL, KARL EBERHARD. *Organographie der Pflanzen.* Ed. 2. Jena, 1913.

GOODRICH, L. LEONORA. *Flora of Onondaga County, as collected by the members of the Syracuse botanical club.* Syracuse, 1912. (Given by Dr. N. L. Britton.)

GRAMBERG, EUGEN. *Pilze der Heimat. Vol. 1. Blätterpilze.* Leipzig, 1913.

IINUMA, YOKUSAI. *Somoko-dzusetsu; or, An iconography of plants indigenous to, cultivated in, or introduced into Nippon (Japan)* Part 1. Herbaceous plants. Vols. 3–4. Ed. 3. Tokyo, 1912.

JANCHEN, ERWIN. *Die europäischen Gattungen der Farn- und Blütenpflanzen nach dem Wettsteinschen System.* Ed. 2. Leipzig, 1913.

JONGMANS, W. J. *Die palaeobotanische Literatur.* Vol. 3. Jena, 1913.

JOST, LUDWIG. *Vorlesungen über Pflanzenphysiologie.* Ed. 3. Jena, 1913.

KLEBAHN, HEINRICH. *Grundzüge der allgemeinen Phytopathologie.* Berlin, 1912.

KÜSTER, ERNST. *Anleitung zur Kultur der Mikroorganismen.* Ed. 2. Leipzig, 1913.

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LORCH, WILHELM. *Die Laubmoose.* Berlin, 1913.

MARZELL, HEINRICH. *Die Tiere in deutschen Pflanzennamen.* Heidelberg, 1913.

MASSEE, GEORGE. *British fungus flora.* Vol. 4. London, 1895. (Given by Mrs. N. L. Britton.)

MASSEE, GEORGE. *Text-book of plant diseases caused by cryptogamic parasites.* London, 1899. (Given by Mrs. N. L. Britton.)

MOLISCH, HANS. *Mikrochemie der Pflanze.* Jena, 1913.

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New York [State] conservation commission. First annual report 1911. Albany, 1912. (Given by Dr. N. L. Britton.)

Park system of Oakland, California. [Oakland, 1910.] (Given by Dr. J. H. Barnhart.)

PASCHER, ADOLF A. *Die Süsswasserflora Deutschlands, Osterreichs und der Schweiz.* Heft 2, 3, 9, 10. Jena, 1913.

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5 portraits of botanists. (Given by Prof. H. F. Osborn.)

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Proceedings of the University of Durham Philosophical Society. Vols. 1–4. Newcastle-upon-Tyne, 1898–1912.

SARGENT, FREDERICK LEROY. *Plants and their uses.* New York, 1913. (Given by Dr. N. L. Britton.)

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SMALL, JOHN KUNKEL. *Flora of Miami; being descriptions of the seed-plants growing naturally on the Everglade Keys and in the adjacent everglades; southern peninsular Florida.* New York, 1913. (Given by Dr. J. K. Small.)

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STEHLI, GEORG. *Das Mikrotom und die Mikrotom-Technik.* Stuttgart, [1913].

STRASBURGER, EDUARD, & BENECKE, WILHELM. *Zellen- und Gewebelehre: Morphologie und Entwicklungsgeschicte. 1. Botanischer Teil.* Leipzig, 1913.

STRASSBURGER, EDUARD, & KOERNICKE, MAX WALTHER. *Das botanische Praktikum.* Ed. 5. Jena, 1913.

THONNER, FRANZ. *Die Blütenpflanzen Afrikas. Nachträge und Verbesserungen.* Berlin, 1913.

TOBLER-WOLFF, GERTRUD. *Die Synchytrien. Studien zu einer Monographie der Gattung.* Jena, 1913.

TUNMANN, O. *Pflanzenmikrochemie.* Berlin, 1913.

TRELEASE, WILLIAM. *Agave in the West Indies.* Washington, 1913. (Given by Dr. N. L. Britton.)

VRIES, HUGO DE. *Die Mutationen in der Erblichkeitslehre.* Berlin, 1912.

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WARBURG, OTTO. *Die Pflanzenwelt.* Vol. 1. Leipzig, 1913.

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ZIMMERMANN, ALBRECHT WILHELM PHILIPP. *Der Manihot-Kautschuk; seine Kultur, Gewinnung und Präparation.* Jena, 1913.

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The New York Botanical Garden

EDITOR

ARLOW BURDETTE STOUT

Director of the Laboratories

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JOURNAL

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THE IMPERIAL BOTANIC GARDEN OF PETER THE GREAT AT ST. PETERSBURG*

On June 24, the bicentenary of the Imperial Botanic Garden of St. Petersburg was celebrated under the auspices of the Russian government. The festivities, which were of a very solemn character, took place in one of the buildings in the Garden and were attended by the Princes Peter and Alexander of Oldenburg, Prince Gagarin as representative of Princess Eugenia of Oldenburg, the patroness of the Garden, the Ministers of Agriculture and Crown Domains, Commerce, Justice, Public Instruction and Marine, and other prominent officials and a large number of delegates from the Russian academies, universities, botanic gardens and similar institutions and from foreign countries. The Royal Botanic Gardens, Kew, and the Physic Garden, Chelsea, were represented by the writer of this article.

The meeting was preceded by a Te Deum, after which the Minister of Agriculture and Crown Domains opened the proceedings with a short address and the reading of a rescript from the Emperor by which the name of the Garden was changed into that of Imperial Botanic Garden of Peter the Great. Then followed an oration by the director, Professor Fischer von

* An article published in the *Kew Bulletin of Miscellaneous Information*, No. 7, 1913, pages 243–252, and reprinted here by permission of the Controller of His Britannic Majesty's Stationery Office. In the *Kew Bulletin* the article is illustrated with two plates not included in this reprint.

[JOURNAL for November, 1913 (14: 181–193) was issued December 4, 1913]

Waldheim, dealing with the history and the functions, past and present, of the Garden, and the reading of the addresses, first of the foreign delegates and then of the representatives of the Russian learned societies and corporations and other bodies connected with botany. The address embodying the greetings and congratulations of Kew runs as follows:

"On the Occasion of the Two Hundredth Anniversary of the foundation of the Imperial Botanic Garden, St. Petersburg, the Royal Botanic Gardens, Kew, beg to join with other Botanical Establishments throughout the world in the expression of warm congratulations and good wishes.

"The cordial relations which in the past have subsisted between the sister institutions have benefited both gardens and furthered the cause of that science to which the two are devoted. That these relations may be as distinctive of the future, that the services of the Imperial Garden to science may be as marked, and that its welfare and renown may be as great as in the past is the cordial wish of the Royal Botanic Gardens at Kew."

History of the Garden

The Botanic Garden of St. Petersburg was founded by Peter the Great about 1713. The date usually given is the 11th February (old style), 1714, but Lipsky has been able to prove from documentary evidence that it was in existence at least as long ago as the 11th December (old style), 1713. There are therefore only ten years between the foundation of St. Petersburg itself and that of its Botanic Garden. If the laying out of the capital on the marshy banks and islands of the Neva was a bold and hazardous enterprise which only the genius and the iron will of the great ruler could carry out, the foundation of a garden on such ground was in its own way a no less bold experiment. The site selected for the garden was on one of the northern islands in the angle formed by the Greater Nevka and a small branch of the latter, the Karpowka. It was very low and consequently much exposed to floods. The primary object of the garden was the cultivation of medicinal plants for the army and navy. Hence its designation as Apothecaries' Garden and of the island

on which it was situated as Apothecaries' Island, a name which is still in use. Subsequently the garden also served teaching purposes, and as its scope was widened, room was made for a more scientific treatment.

We possess a description of the garden by Peter von Haven, a Dane, who went to St. Petersburg in 1736. Speaking of Apothecaries' Island, which at that time was covered with a pretty spruce-wood through which avenues had been cut, the writer says: "The finest thing in the island is, however, the garden from which the island has its name. . . . One finds there many kinds of plants and trees as occur in Europe and Asia, particularly in the greenhouse—so many, in fact, that Professor Siegesbeck, who is Director of the garden, assured me repeatedly that of all the gardens he had seen in other countries or from which he had catalogues, none was equal to it. At my time several hundred new species were introduced from China and Tartary, so that the Doctor was busy enough with giving them new names. The garden provides all the apothecaries with herbs, whence it is called Apothecaries' Garden. An apothecary resides always in the garden and it is his business to gather the herbs and prepare them. There are also plenty of fruit trees, as is evident from the fact that the rent of the fruit trees yields several hundred Reichs-Thaler per annum. However, it must be admitted that most of the fruit is neither so large nor so good as with us."

Of the men who directed the garden or were otherwise connected with it, it may be sufficient to mention J. C. Buxbaum, the traveller, J. G. Siegesbeck, known through his opposition to Linnaeus, and J. P. Falk, the explorer of Russia and a pupil of Linnaeus. The number of species cultivated in the Apothecaries' Garden does not seem to have at any time been very large. F. E. L. Fischer estimates it at 1,300* at its highest. In the beginning of the last century its importance declined very much, and was quite overshadowed by the fame of Count Alexis Rasumowsky's garden at Gorenki, near Moscow. This garden owed its existence entirely to the enlightened taste and the generous liberality of its owner, and its dissolution after his

*A "Catalogus plantanum horti Imperialis medici Petropolitani in Insula Apothecaria," published in 1796, contains 1,456 species.

death in 1822 appeared inevitable. In those circumstances the Emperor Alexander decided on the complete reorganization of the old garden on Apothecaries' Island, and F. E. L. Fischer, who since 1804 had directed the garden at Gorenki with so much success, was entrusted with the work.

This was begun early in 1823, and proceeded with such rapidity that three years later the last of the glasshouses was completed. Their total length ran to about 1,600 m.* and they cost over £19,000. At the same time a sum of £3,178 was granted for the purchase of plants and the annual budget of the Garden was fixed at about £2,200. In 1824 F. E. L. Fischer himself went abroad to visit the more important Gardens of Germany, France and England, returning with 3,230† species of living plants. In England Fischer visited the Royal Gardens at Kew, the garden of the Horticultural Society, Chiswick, and the Botanic Gardens of Chelsea, Edinburgh, Glasgow, and Liverpool. In London alone the purchases amounted to about £1,600, whilst the plants presented were estimated to have equalled if not exceeded that sum in value. Falderman, a gardener with the Royal Horticultural Society, was engaged as head gardener for St. Petersburg, and he and Goldie, another English gardener who had travelled in America, were entrusted with the task of taking the collection of treasures safely to St. Petersburg. By 1830 the number of species in cultivation had risen to over 12,000. At the same time the great library of the Gorenki garden and that of Dr. Stephan were taken over and an annual grant of £180 made for the maintenance of the library. Thus the foundation was laid for a botanical library which as to completeness has for a long time been unequalled and even now has but few rivals in the world. In a similar way provision was made for the establishment of a herbarium, the nucleus of which was formed by what was then left of Professor Stephan's Russian collections,

* Fischer (in *Flora*, 1831, p. 99) says: "750 Sarschinen oder 4,130 englische Fuss." As a "sarschine" or "sasheen" is equal to 7 ft. (English), there must be some mistake in this statement. The conversion into meters was made from the dimensions as given in "sasheens."

† This is the figure given by Fischer himself in *Verhandl. Verein. Beförd. Gartenb. in d. K. Preuss. Staat.*, 1844, p. 3 (reprint); see also English translation in *Bot. Mag.*, Vol. LXXI, at end, p. 26.

by Riedel's Brazilian herbarium, and other sets. Fischer's own herbarium (containing about 60,000 species) remained his private property until his death, when it was purchased for the Botanic Gardens from his widow. F. E. L. Fischer's task was greatly facilitated by the wide connections he had formed whilst still at Gorenki. He counted among his personal friends Sir William Hooker, with whom he corresponded up to the end of his life.

The Apothecaries' Garden at the time of its reorganization had its name altered to that of Imperial Botanic Garden, while it was at the same time transferred from the Medico-chirurgical Collegium to the Ministry of the Interior and, in 1830, to the Ministry of the Imperial Household, where it remained until 1863. In 1830 the annual budget was £4,250 and the size of the Garden not quite 22 hectares (about 54 acres).

Fischer retired in 1850 and was succeeded by C. A. Meyer, who since 1832 had been assistant director at the Imperial Botanic Garden. He died in 1855, when Eduard Regel, chief gardener in the establishment, was appointed director. With him a new period in the history of the garden began. As already stated, the garden remained under the Ministry of the Imperial Household until 1863, and till then Regel acted as director. When, however, it was decided to transfer the establishment to the Ministry of Crown lands, Trautvetter was entrusted with the administration of the Garden, and in 1866 took the title of director of the Garden, Regel continuing to superintend the herbarium and the cultures, and later on the cultures alone, as "chief botanist." In 1875 Trautvetter retired and Regel became again director of the Garden, which was henceforth under his control until his death in 1892. It was during Trautvetter's interregnum, in 1869, that C. Maximowicz was appointed chief botanist, or botanicus primarius in charge of the herbarium, which post he held until his untimely death in 1890. These two men, however different in tastes, temperament and genius, have left their mark on the work and the position of the Petersburg Garden as it was up to nearly the end of the last century. It is not here the place to apportion their respective shares; but both

Regel, the practical man, and Maximowicz, the scholar, found their opportunities mainly in the marvellous progress made in their day in the exploration of central and eastern Asia. In consideration of the geographical position of the Russian Empire and owing to the natural course of events, they wisely concentrated their efforts more and more upon that vast area extending from the Caspian to the Yellow Sea. In the Herbarium this made itself felt in the necessity of building up special collections, such as a Herbarium Rossicum, and a Herbarium Sibiricum, etc., by the side of the Herbarium Universale. In the garden an increasing number of Central and East Asiatic species were brought into cultivation, most of which found their way into European gardens, thanks to the liberality of Eduard Regel. The publications, moreover, which emanated directly and indirectly from the establishment have been devoted almost entirely to the floras of Russia and central and eastern Asia. Nowhere is this more evident than in the *Acta Horti Petropolitani*, founded by Trautvetter in 1870 and continued by Regel and his successors.

A "seminarium," or depot for seeds, gathered in the Garden or received from travellers and explorers or by exchange, purchase or gift had been, it seems, a feature of the establishment from the earliest times. It continued to be a special department along with that of the "chancery" or director's office, the "park" or grounds, the greenhouses, the herbarium and the library. To these departments in course of time were added a museum containing carpological specimens, samples of woods, fossil plants and economically interesting objects, a biological laboratory, in 1868, and a seed control station, in 1870. To give an idea of the size to which the collections had grown towards the end of Regel's directorship, it may be stated that the number of species and varieties in cultivation in 1892 is given as 27,030, that the annual accession to the herbarium from 1872 to 1892 had on the average been 20,000 specimens, whilst the library had grown by the end of 1892 to 24,000 volumes. The budget for the Garden was fixed at £6,330 in 1870 and, apart from extraordinary grants which became necessary from time to time, remained so under Regel.

Eduard Regel was succeeded by A. F. Batalin, who died four years later, and was himself succeeded in 1897 by Dr. Alexander Fischer von Waldheim, then professor of botany in the University of Warsaw.

The collections had long ago outgrown the accommodation provided for them, and the housing of the invaluable herbarium and library especially was dangerously inadequate. The existing laboratories were cramped for want of space; moreover, new branches of the science of botany claimed admission into the organization represented by the Imperial Botanic Garden, with the greater force, in that as their practical value was immediately and therefore doubly obvious. The time had come for new buildings and the general reorganization of the establishment. The erection of a new palm house and a Victoria regia house had already been decided on in 1896. They were completed in 1899 at a cost of over £19,000. Then in 1900 the annual grant of the Botanic Garden was raised to £12,768. A phytopathological station was established in 1901 and gradually enlarged. On August 21, 1911, the foundation was laid for a new building for the herbarium and the library. It is now finished at a cost of £31,780 and is ready to receive the collections. A similar amount has been sanctioned for the erection of a new building for the museum, and it is contemplated that the work will be begun next year. The other departments of the Garden have each claimed and received a similar attention, and those who, like the writer, have had an opportunity of comparing the state of the establishment as it presents itself today with what it was 20 years ago will not fail to appreciate the great progress which has been made during that period in almost every direction.

Organization of the Garden

The wide range of the work with which the Imperial Botanic Garden of Peter the Great is charged is thus defined in the official French guide issued on the occasion of the bicentenary: The garden is intended principally for the study of the plants which compose the flora of Russia and the adjoining Asiatic

countries; for the study of vegetable products; for research in plant anatomy and physiology; for the study of plant parasites and the means of combating them; for seed control; for the study of the properties and the cultivation of plants which may be of practical importance for agriculture, horticulture, industries or medicine; and, finally, for the popularization of the botanical sciences.

This work is divided among the following departments: (1) the park or the grounds, (2) the glasshouses, (3) the herbarium, (4) the museum, (5) the library, (6) the biological station, (7) the seed control station, (8) the phytopathological station, (9) the seminarium, (10) the chancery or director's office, (11) a school for gardening.

The director is assisted by a scientific staff, consisting of three chief botanists, one chief conservator, five conservators, two assistant conservators and a librarian; by the staff of the "chancery," which includes one secretary and accountant, one cashier, one "intendant," one clerk and two assistant clerks; and, finally, by two head gardeners and two garden assistants. There are further employed 35 skilled gardeners, about 50 "fixed" laborers of both sexes, and about as many artisans, guards, porters and inferior hands. The Garden has also its own electric station, superintended by an electrical engineer. The impending completion of the reorganization of the Garden will naturally necessitate a considerable increase of the staff and of the annual grant, which it is expected will reach a total of between £17,000 and £18,000.

The glasshouses are open to the public through the year, the grounds at all seasons with the exception of the winter, and the herbarium, museum and library on days and at hours fixed by the administration.

The Park.—The situation of the Garden has already been described. Its total area is about 22 hectares (54 acres), 12 hectares (not quite 30 acres) of which form the park. This "park" is mainly laid out as an arboretum, with a parterre in the center for the reception in summer-time of flowering plants from the glasshouses, and a belt of rockwork, rather over-

elevated, principally for the display of plants from Asiatic Russia and the adjoining countries, the plants being grouped geographically. There are also beds with representatives of the principal natural families of certain biological types and of economically interesting plants, on the whole pleasantly worked into the landscape. Very prettily laid out are some groups along a sluggish watercourse, more or less overshadowed by trees, and given up partly to a collection of plants characteristic of the flora of St. Petersburg and partly to systematic groups, including a large number of hygrophilous or aquatic and sub-aquatic plants. One can see that they feel at home and harmonize in their ecological requirements with the wood, towards the edge of which they are placed. If Peter von Haven's statement that Apothecaries' Island in his day was mostly covered with a spruce wood is correct, as it very likely may be, it is clear that very little of the original vegetation has been left in the Garden. Of conifers only the native species (spruce, common pine and larch), *Larix sibirica* and *L. dahurica*, and *Thuya occidentalis* seem to thrive well. The prevalent trees of the Arboretum are deciduous, as for instance limes (mostly *Tilia cordata*, or as they are labelled *T. ulmifolia*), poplars, birches, elms, willows, maples (*Acer platanoides*), bird-cherries, mountain ashes, etc. The ground underneath the trees is covered with a fairly luxuriant herbaceous vegetation, which in the small clearings forms typical northern meadows. Avenues are cut through the wood, and shrubs have been planted alongside and in other open places, some of which are doing exceedingly well, as for instance *Rubus nutkaensis*, *Cornus alba*, *Lonicera tatarica*, several species of *Crataegus* (particularly *C. sanguinea*) and *Cotoneaster*, *Spiraea sorbifolia*, *Caragana frutescens*, etc.

No great variety or brilliant effect can be expected from a garden in the latitude of the Shetlands, where the snowdrop and the hazel do not begin to flower until towards the last week of April or even the beginning of May and frosts set in usually in the first week in October. Yet the aspect of the Garden and especially of the wooded portion with its rich young green is very pleasant indeed in the long days of the early summer and

evidently much appreciated by the public which crowd there on Sundays.

The number of perennials grown in the grounds was given in 1912 at 4,946 species and varieties, and those of the annuals at 1,576.

The Glasshouses.—The disposition of the glasshouses is still according to F. E. L. Fischer's plan of 1824. They are arranged along the sides of a square about 200 m. by 150 m. A cross range parallel to the longer sides divides the square into nearly equal halves, whilst two smaller ranges project into the southern court. The large new palm house and the pretty Victoria regia house jut out from the south side; the total length of the glasshouses amounts to over 1 km. and the space covered by them to 3 hectares (7.4 acres). The collection of plants contained in them is extremely rich, comprising over 19,000 species and varieties. The palm house and the Victoria regia house as well as all the greater part of the other houses are iron structures with single glazing. The problem of keeping a thermophilous vegetation not only alive but flourishing in a climate with six months of winter and much reduced daylight is certainly one of very great difficulty; but a visit to the fern, aroid, cycad or palm houses shows that the difficulties have been overcome in a surprising way, mostly, it seems, by keeping the temperature during the winter as low as the plants will stand it—for instance at 2.5–5° C. in the great fern house, 5–7.5° C. in the rhododendron house, which also contains cacti and succulent euphorbias—and thus reducing the vital processes to a minimum during the critical period.

Long ago attempts had been made to introduce landscape gardening into the larger houses. Cohn, more than 50 years ago, has spoken in enthusiastic terms of the effects thus obtained and they deserve, indeed, no less praise today. In the summer, when so many of the less delicate plants are transferred to the "parterre" in the "park," it may be difficult to form an idea as to the state of the houses during the greater part of the year, but the hothouses did not appear overcrowded, and the largest of them produced a striking effect owing to the freedom allowed

to the plants which seemed to be perfectly at ease and able to display all their charms. The fern (No. 2), cycad (No. 17) and the palm (No. 26) houses may be singled out as particularly deserving of admiration. Among the ferns some splendid specimens of *Osmunda regalis* with a base as colossal as that of an old *Todea* may be mentioned, if only because one of them has been promised to Kew. They were obtained from Sotshi (district of the Black Sea) in the Caucasus.

The Museum.—The museum is at present housed in a narrow building erected in the north court and along the central range of glasshouses. It comprises eleven rooms in which a small part of the very extensive collections is displayed in upright and table show cases. A considerable portion of one of the rooms is given up to the illustration of the desert flora of Turkestan which moreover, like that of Kamtschatka, is represented by a large number of excellent photographs, many being in the form of transparencies hung against the windows. The publication of a selection of these photographs would, no doubt, be welcomed by many botanists. Quite unique are a priceless collection of ginseng roots, and a very effective exhibition of sand-dried flowers.

The erection of the new museum building will afford the much needed opportunity for the adequate display of the treasures which are at present still hidden away in cases and cabinets. The extent of the museum collections may be grasped from the figures given in the French guide book of the Garden, namely 8,400 specimens for the dendrological, 29,400 for the carpological, 2,800 for the paleontological and 7,400 for the economic collection.

Biological Laboratory.—This adjoins the museum and is principally destined for the study of purely scientific or practical questions relating to plant life. Lately the work done there has been particularly concerned with problems connected with chlorophyll.

Herbarium.—This is, as already stated, one of the most important departments of the establishment. As it will fortunately be moved very soon into the new building, it is not worth while to dwell on the conditions of its present home.

The new building stands in the southwest corner of the gardens, about 200 m. from the glasshouses and the center of the park. It is a large building of four stories with an unpretentious elevation. The ground plan occupies an area about 85 m. long and 22.5 m. deep in the center and 16 m. in each of the two wings. The construction throughout is fireproof. The central block contains the main staircase, lavatories and a lift, then on the ground floor, the vestibule and an inquiry office, and on each of the other floors a large general working room (15.3 m. × 6.8 m.). The wings are intended for the library (ground floor) and the herbarium (the other three floors). There are two office rooms for the scientific staff on each wing and on each floor. The eight large rooms in which the collections will be housed receive their light through five windows each on the west and four windows each on the east side. The floor space available for collections amounts to about 2,400 m. (900 m. for books and 1,800 m. for herbarium). The cabinets for the reception of the herbarium will be placed in double blocks between the windows and at right angles to them, and along the transverse walls. Room is marked out for 178 cabinets on the first and 292 on the third and fourth floors or 470 cabinets altogether. The cabinets are made of pinewood with birch wood veneering, each holding 60 shelves. The total number of shelves proposed is therefore 28,200. They are of two sizes, according to the two sizes of paper used for mounting. The collection is estimated to contain 90,000 species in 2,500,000 specimens. It is divided into 10 separate herbaria: (1) a general herbarium of Phanerogams and vascular Cryptogams; (2) a general herbarium of lower Cryptogams; (3) a Chino-Japanese herbarium; (4) a Russian herbarium; (5) a herbarium of Turkestan; (6) a Siberian herbarium; (7) a herbarium of the flora of St. Petersburg; (8) a herbarium for teaching purposes; (9) an Arctic herbarium; (10) a collection of useful plants.

An ample supply of incandescent lamps provides for the illumination of the herbarium, while the heating is effected by hot water pipes. The scientific work undertaken at the herbarium will also in the future be mainly concerned with the floras of Russia and the adjacent countries. The collections are available for study by visitors on week days from 11 to 3 o'clock.

Library.—The library has until now been lodged in the same building as the herbarium, but before long it will be moved into the new herbarium building. It numbers at present 17,000 works in over 38,000 volumes. The books are kept in glass cases which are locked. There are three catalogues in use: (1) a chronological catalogue in 6 volumes; (2) an alphabetical card catalogue and (3) a subject catalogue (printed). For administrative purposes the library and the herbarium form separate departments under the control of the director. Visitors have access to the library on week days from 10 to 3 o'clock, excepting Saturdays (in the summer).

Seed Control Station.—This is in the same building as the museum and it also has its own staff and special equipment. It possesses a mycological collection, a collection of diseased or otherwise injured plants, spraying appliances and other similar instruments for the destruction of parasitic organisms. The station is devoted primarily to research work, but also supplies gratis information concerning plant diseases and mycology generally.

Seminarium.—The functions of this department have already been explained on p. 200. It is at present lodged in the herbarium building.

School of Horticulture.—This is an elementary school attached to the Garden and under the control of the director, but maintained by the Society for the Protection of Poor and Sick Children of St. Petersburg and is subsidized by the government. It occupies a special building and has its own fruit and vegetable garden.

It only remains to add a few words concerning the official publications emanating from the Imperial Botanic Garden. The principal journal, *Acta Horti Petropolitani*, has already been mentioned. It has run to more than 30 volumes, with about 18,000 pages. To this was added in 1901 the *Bulletin du Jardin Impérial Botanique de St. Petersbourg*, and in 1902 the *Journal traitant les moyens de combattre les maladies et les lésions des plantes cultivées et des plantees sauvages utiles*, which in 1907 was superseded by another journal under the title *Les maladies des*

plantes, and finally in 1912 the *Annales de la station d'éssais de semences*. The annual seed lists (Index—now "Delectus"—Seminum quas Hortus Botanicus Imperialis Petropolitanus pro mutua commutatione offert), which were started by F. E. L. Fischer in 1835 and the earlier issues of which contain descriptions of many new species, have been continued so far without a break.

The bicentenary of the Imperial Botanic Garden of St. Petersburg has called forth the publication of a great memoir on the history (from 1713 to 1913) and the organization of the Garden. So far, one volume, "Historical Sketch of the Imperial Botanic Garden of St. Petersburg (1713–1913)," by V. I. Lipsky, has been published, a quarto of 412 pages with 54 illustrations, mostly views from the Garden and in the houses. Not less than 297 pages are given up to the early history of the Garden (1713–1823), so much of which has hitherto been obscure.

Like most modern scientific works published in Russia, the memoir is written in Russian, as is the bulk of the more recent publications that have emanated from the great Garden at St. Petersburg, although some of them are accompanied by summaries in German or French. In so far as botany is concerned, a great change has come about during the last two decades in the use of Russian by Russian writers. Before then German, and to a smaller extent Latin and French, were the recognized vehicles for the communication of the results of botanical research work achieved by Russians in Russia. The history of the development of science in Russia is sufficient to explain that fact. Today Russian science is rooted in the Russian people, and it has begun to speak almost exclusively in its own native tongue. Those who wish to see science internationalized—and in the end science is of all countries and not of any particular one—may sigh at the new burden which is laid on their shoulders by the upgrowth of a rapidly increasing literature written in a language which, beautiful as it may be, is really very difficult. Latin as a means of intercommunication is—apart from technical descriptions—practically dead and artificial languages are as remote as ever from practical application. There is indeed for

the coming generation no way out of the dilemma save to recognize the process as a perfectly natural, legitimate and inevitable one and to add to its equipment a knowledge of a language which has already given much and promises to give still more. This was perhaps the lesson which impressed itself most on the writer during the days when the Botanic Garden on the Neva celebrated its bicentenary amid the acclamations of an assemblage as enthusiastic as it was representative of all that is connected with botany throughout the great Russian Empire.

O. STAPF

CONFERENCE NOTES

The November conference of the Scientific Staff and Registered Students of the New York Botanical Garden was held in the laboratory of the museum building on the afternoon of November 5, at which the following reports of investigations were presented:

"Summary of two years' study of bud-variation in *Coleus*," by Dr. A. B. Stout.

The studies on bud-variation in a variety of *Coleus Blumei*, reported and briefly outlined at the conference in October, 1912, have been continued during the intervening year. At the present time 482 plants have been grown in series of pedigreed cuttings all derived from two plants which had at first leaves with a color pattern of green, red and yellow. In this type the red is chiefly in blotches in the epidermis, the green is in the central part of the leaf and the yellow forms an irregular band about the green.

Bud-variations have given at the present time ten quite distinct color patterns involving loss of one or even two of the three color elements, the increase of the red to a solid epidermal covering, and the reversal of the relative positions of the green and the yellow. Marked variations in the shape of the leaves have also appeared. Two cases of change in the phyllotaxy have arisen both having six ranks of leaves arranged in whorls of three.

The variations in color are complete for single branches, for a

segment of a branch or for a series of related branches. The greater number appear in lateral branches and are in evidence when the first leaves develop.

Thus far the various types that have appeared have proven sufficiently constant to maintain the type. Yet none of the types that have been tested by a considerable number of progeny (vegetative propagation) have proven constant.

Plants were exhibited to illustrate the types of foliage, the numerous sectorial arrangements of different patterns and the appearance of sporting branches.

"Former climatic conditions in Alaska as indicated by the Cretaceous and Tertiary Floras," by Dr. Arthur Hollick.

The subject of climatic conditions in the past history of our earth has always been, and is yet, one that has induced almost endless discussion of both theories and facts.

It is generally conceded that the known facts warrant us in assuming that the earth has been gradually cooling ever since its origin as an incandescent mass; and that, until the advent of the Ice Age, it possessed greater uniformity of temperature throughout its surface than it does today. In other words, that what we know as climatic zones (torrid, temperate and frigid) are modern terrestrial features which did not obtain in the past.

At any rate we know, as a fact, that the flora of the earth, up to and including that of the Tertiary Period, was practically uniform, specifically as well as generically, from the equator to as far north as any geological investigations have been made beyond the Arctic Circle.

Now the Cretaceous and Tertiary floras of the United States and Europe were pretty well known a generation ago, through the labors of Newberry, Lesquereux, Heer and Ettingshausen and others; but Alaska was almost a *terra incognita* so far as its fossil flora was concerned. A few Tertiary species had been described from the southern part, but no Cretaceous. In fact any rocks of Cretaceous age had not been definitely recognized anywhere in the territory.

In 1902, M. A. J. Collier, of the U. S. Geological Survey, sent

in a collection of fossil plants from the Yukon valley, which were submitted to Dr. F. H. Knowlton, paleobotanist of the Survey, for examination and report as to the geologic age of the strata in which they were found. They presented such an extraordinary association of floral elements, both from the biological and the stratigraphical point of view, that Dr. Knowlton expressed his suspicion that specimens from different geologic horizons had been mixed—cycads, generically identical with Jurassic types, associated with well-known Cretaceous and Tertiary species of angiosperms, the aggregate apparently representing a mixture of tropical and temperate zone vegetation which was bewildering, besides sadly upsetting all our previous knowledge in regard to the integrity of the floras of the several geological periods mentioned.

It was necessary, however, for the proper geologic mapping of the region that the facts should be definitely ascertained and interpreted, and as this involved a paleobotanical investigation, I was deputed to visit the Yukon valley in 1903, make careful observations and collections, and endeavor, if possible, to settle the points at issue.

Mr. Collier's locality was successfully located and I sent back from there, and from other localities scattered for a distance of about a thousand miles along the Yukon valley, some 1,800 lbs. of fossil plant specimens. The ultimate result was that Mr. Collier was vindicated. The association of floral elements was found to be exactly as his original collections indicated. In fact the cycads and angiosperms were found, not only in the same strata but in the same layers of rock and occasionally so closely associated together that both could be included in one photograph.

Then came the problem of the geological age of the horizon in which these diverse floral elements were associated. The facts were discussed and our final conclusions were that it was more reasonable to infer that the more primitive type, represented by the Jurassic cycads, had persisted into the Cretaceous than that the more highly developed type, represented by the Cretaceous angiosperms, had begun back in the Jurassic. We therefore called the flora Cretaceous. Subsequent stratigraphic

investigations confirmed this view, and the region is now so colored on the geologic map of Alaska.

Now these facts mean, so far as former climatic conditions are concerned, that the climate of the Pacific coast of the North American Continent was at least, as far back as the Cretaceous Period, milder than that of the interior, and that the Cretaceous and Tertiary floras of the coastal region were almost as different from the contemporaneous floras of the interior as they are today.

Doubtless the cause was then, as it is today, the Japan current, which bears a similar relation to the Pacific Ocean that the Gulf Stream does to the Atlantic. It impinges on the coast of Alaska, as the Gulf Stream does in the British Isles and produces a similar climatic effect. The bulk of the territory of Alaska lies in about the latitude of Iceland and southern Greenland and the extreme southern portion in about that of Labrador; but this portion has a mean temperature which is milder than that of New England and with less extremes of temperature; and these conditions, as indicated by the fossil floras, were even more pronounced in the past than they are now. In the Tertiary Period Alaska and Asia were joined by a land bridge, which cut off the Arctic current, and this doubtless was an important factor in modifying the climate. In any event we can state now, with certainty, that cycads and other tropical and semi-tropical plants existed in the coastal region of Alaska long after they had disappeared from the interior and the eastern part of the North American Continent.

Recently I have had another unexpected contribution of specimens which has a further bearing upon the matter of past climatic conditions on our Continent.

The Canadian Geological Survey sent for identification a collection of fossil plant remains from Interglacial clays in the Kootenay Valley. It has always been assumed by geologists that the so-called Glacial Epoch of the Ice Age was not continuous, but that it included several advances and recessions of the continental ice sheet, with mild interglacial epochs intervening. If these specimens have been correctly identified we

have evidence that in at least one of these interglacial epochs true palms advanced as far north as southern Canada. I have refrained as yet from publishing anything in this connection, as it is the first definite paleontologic evidence of its kind, so far as I am aware, and it would not do to make any mistake either in our facts or our conclusions. Careful comparisons have been made, however, and there seems to be hardly any room for doubt in referring certain of these specimens to fruiting spikes of palms and others to fragments of leaves and petioles.

The following materials illustrating various points were exhibited.

Photographs of specimens representing the Cretaceous Cycadales, Coniferales and Angiospermae of Alaska.

Photographs of specimens representing the Pleistocene interglacial clays of the Kootenay valley, Canada (fragmentary fruiting spikes, leaves and petioles of palms, also dicotyledonous leaves, apparently *Platanus*, *Fagus*, etc.).

Specimens from which latter photographs were taken.

A. B. STOUT,
Secretary of the Conference

NOTES, NEWS AND COMMENT

Dr. W. A. Murrill lectured before the students of the Virginia Polytechnic Institute at Blacksburg, Virginia on the evening of November 21, his subject being "The Austrian Tyrol," with special emphasis on the botanical features of that region.

Dr. Carl Skottsberg, lecturer on botany and keeper of the herbarium at the University of Upsala, was a visitor at the Garden on November 20. On the evening of November 17, he lectured before the New York Academy of Sciences on "The Vegetation of Patagonia, Fuegia, and the Subantarctic Islands." Dr. Skottsberg was a member of the Swedish Antarctic Expedition under Nordenskjöld in 1901–03 and since that time has made one or more visits to Patagonia and Tierra del Fuego.

Dr. J. N. Rose spent two weeks at the Garden in December studying the collections of cacti.

Nearly two hundred colored drawings of local fleshy fungi have recently been mounted in the swinging frames of the public museum of the New York Botanical Garden.

Professor F. L. Stevens has resigned the position of Dean of the College of Agriculture, Mayaguez, Porto Rico, to become Professor of Plant Pathology in the University of Illinois. His address after February 1 will be Urbana, Illinois.

Dr. C. H. Kauffman, Assistant Professor of Botany in the University of Michigan, has been granted a research scholarship for February, 1914, to aid him in the preparation of manuscript for North American Flora on the genus *Cortinarius*.

The first sections of the new laboratory building and conservatories of the Brooklyn Botanic Garden were inspected by a number of the friends of the institution on the afternoon of December 13. Several members of the staff of the New York Botanical Garden were present.

Dr. C. H. Ostenfeld, of the Botanical Museum at Copenhagen, Denmark, spent several days at the Garden early in December examining the herbarium. On December 13, he sailed for Porto Rico, and will spend the winter in the West Indies, returning to Copenhagen about April 1.

Dr. T. C. Frye, of the University of Washington, Seattle, Washington, visited the Garden during the latter part of December for the purpose of consulting the library. He will attend the meeting of the American Association for the Advancement of Science, at Atlanta, during Convocation Week, and will visit other eastern libraries and herbaria early in the new year.

Meteorology for November.—The total precipitation for the month was 1.67 inches. Maximum temperatures for each week were as follows: 68° on the 6th, 57° on the 15th, *74° on the 20th,* and 52° on the 26th. The minimum temperatures were 30° on the 6th, 28° on the 13th, 35° on the 18th, and *26° on the 27th.*

ACCESSIONS

MUSEUMS AND HERBARIUM

46 specimens of flowering plants from the Black Hills, South Dakota. (By exchange with Mr. W. P. Carr.)

4 specimens of *Salicornia* and *Spirostachys* from Utah. (By exchange with Professor A. O. Garrett.)

1 specimen of *Xanthoxalis Suksdorfii* from Oregon. (By exchange with Dr. H. D. House.)

3 specimens of Hepaticae from Maine. (By exchange with Miss Annie Lorenz.

33 specimens of mosses from Orange City, Florida. (By exchange with Mr. S. C. Hood.)

15 specimens of mosses from Stamford, New York. (Given by Mr. Percy Wilson.)

1 specimen of *Evernea vulpina* from Wawona, California. (Given by Miss Mary A. Compton.)

4 specimens of marine algae from southern Chile. (By exchange with the Royal Botanical Garden, Berlin, Germany.)

1 specimen of *Bryum Bohnhofii* from Ceylon. (By exchange with Professor Edward B. Chamberlain.)

11 specimens of Hepaticae from Vermont. (By exchange with Miss Annie Lorenz.)

608 specimens from St. Domingo and St. Kitts, West Indies. (Collected by Dr. J. N. Rose.)

2 specimens of Hepaticae from Porto Rico. (By exchange with Brother Hioram.)

25 specimens "Fungi Dakotenses," fasc. 9. (Distributed by Dr. J. F. Brenckle.)

6 specimens of fungi from Colorado. (By exchange with Professor T. D. A. Cockerell.)

4 specimens of fungi from Porto Rico. (By exchange with Professor F. L. Stevens.)

10 specimens of fungi from Colorado. (By exchange with Professor Ellsworth Bethel.)

1 fungus from New York. (Collected by Mr. Percy Wilson.)

100 specimens "Fungi Exotici Exsiccati," fascicles 3 and 4. (Distributed by H. & P. Sydow.)

10 specimens of fungi from California. (By exchange with Professor W. A. Setchell.)

150 specimens of fleshy fungi from Santa Barbara, California. (By exchange with Mr. O. M. Oleson.)

2 specimens of polypores from North Carolina. (By exchange with Dr. H. D. House.)

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